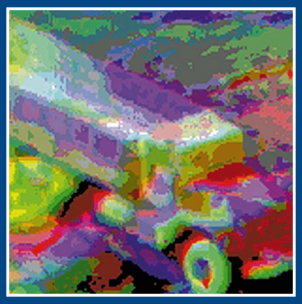
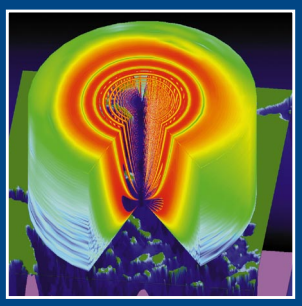
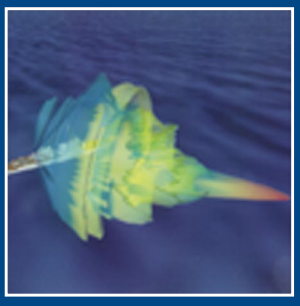
Naval Research Laboratory

Washington, DC 20375-5320 NRL/PU/5230--99-380 June 1999



NRL FACT BOOK

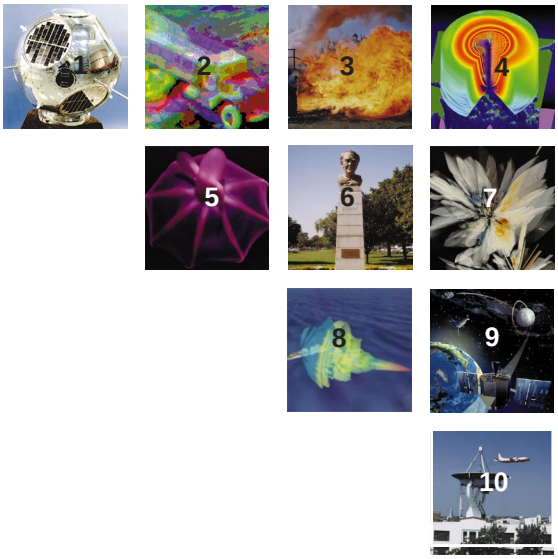
Celebrating 75 Years

The *NRL Fact Book* is prepared every two years as a reference source for information about the Naval Research Laboratory (NRL). To provide additional information to the reader, a point of contact is listed for each activity.

NRL has a continuing need for physical scientists, mathematicians, engineers, and support personnel. Vacancies are filled without regard to age, race, creed, sex, or national origin. Information concerning current vacancies is furnished on request. Address all such inquiries to:

Human Resources Office
Staffing and Classification Branch (Code 1810)
Naval Research Laboratory
Washington, DC 20375-5320

Front cover: All images on the front cover except 6 and 10 were winners of the NRL Science As Art Contest that was conducted as part of NRL's 75th Anniversary celebration.



1. First United States reconnaissance satellite system, the Galactic Radiation and Background (GRAB) satellite system
2. Multispectral IR image of a truck viewed in the afternoon using two MRIR bands and one LWIR band
3. In an effort to improve Naval firefighting procedures, an experimental study was performed to develop safe, reproducible full-scale tests as a basis to study the development and mitigation of Class B backdraft explosions.
4. This image depicts transmission loss using the Radio Physical Optics model in the Aegean Sea.
5. This umbrella-shaped cirrate octopod was immortalized in about 2310 m of water during the 1996 geophysical expedition to the Norwegian-Greenland Sea. A deep-tow Benthos camera system was used.
6. Bust of Thomas Edison appears at NRL's main entrance. NRL began operations in 1923 as a result of Thomas Edison's vision for the nation's need of "...a great research laboratory..."
7. The result of an investigation where polycrystalline powder of chemically altered tartaric acid was examined at 90 °C under an optical microscope
8. Three-dimensional antenna pattern of a fire-control radar aboard a *Burke*-class ship. This frame is from an animated visualization of data from an at-sea test of the fire control system.
9. Artist's rendering of the Deep Space Program Science Experiment (DSPSE), otherwise known as *Clementine*, which generated 1.8 million images of the moon.
10. An NRL P-3 flies by Building 43 on the actual day of NRL's 75th anniversary, July 2, 1998. Mounted on top of this building is a 50-ft radio telescope dish, which has become the unofficial symbol of NRL. Originally constructed in 1951 and modified in 1958, scientists called it the first "accurately figured radio telescope in the world."

NRL's URL: http://www.nrl.navy.mil/

Quick Reference Telephone Numbers

	NRL WASHINGTON	NRL-SSC	NRL-MONTEREY	NRL CBD	NRL FSD Patuxent River
Hotline	(202) 767-6543	(228) 688-5001	(831) 656-4721	(202) 767-6543	(301) 342-4926
Personnel Locator	(202) 767-3200	(228) 688-3390	(831) 656-4731	(410) 257-4000	(301) 342-4926
DSN	297- or 754-	485	878	—	342
Direct-in-Dialing	767- or 404-	688	656	257	342
Public Affairs	(202) 767-2541	(228) 688-5328	(831) 656-4708	—	(301) 342-4926

Additional telephone numbers are listed on pages 144 and 145.

NRL FACT BOOK

NAVAL RESEARCH LABORATORY
WASHINGTON, DC 20375-5320

Contents

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The Naval Research Laboratory is located in Washington, DC, on the east bank of the Potomac River.

The NRL Marine Meteorology Division is located in Monterey, California (NRL-MRY).

The Naval Research Laboratory Detachment is located at Stennis Space Center, Bay St. Louis, Mississippi (NRL-SSC).

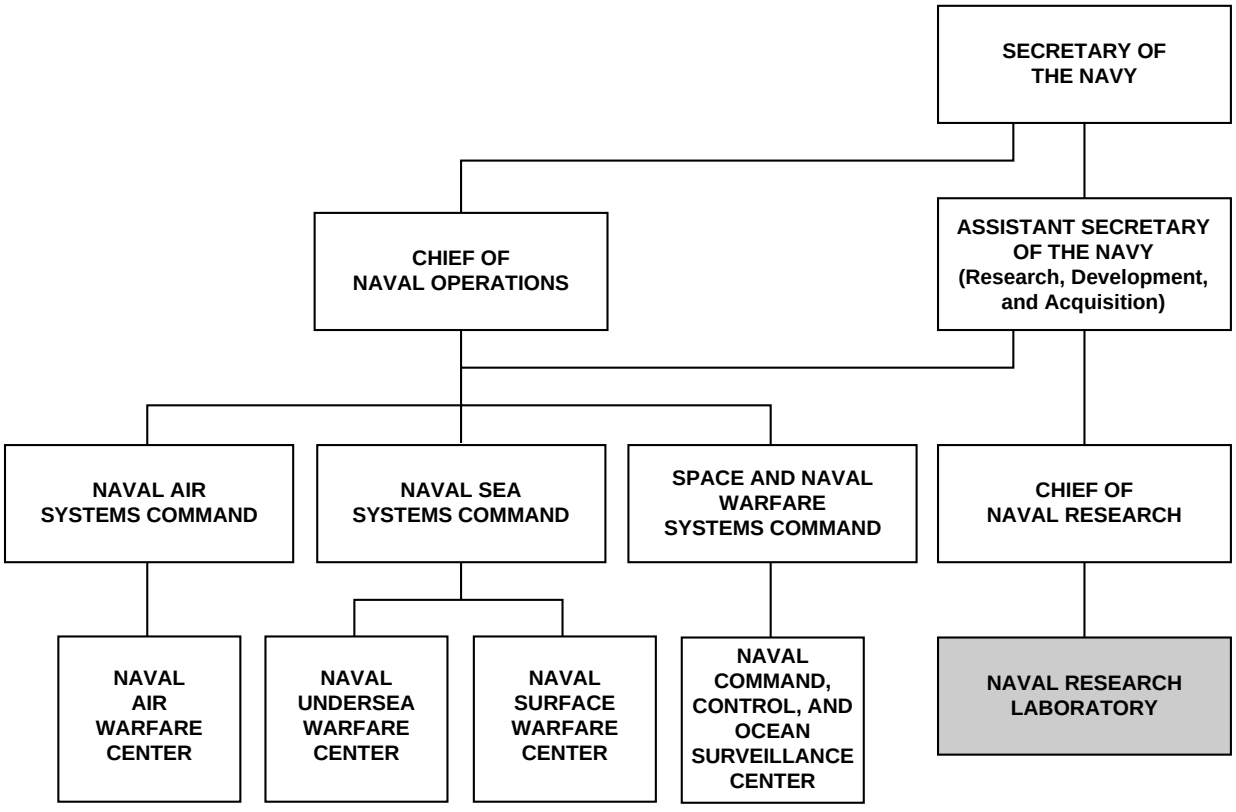
Introduction to the Naval Research Laboratory

Mission

To conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward maritime applications of new and improved materials, techniques, equipment, systems, and ocean, atmospheric, and space sciences and related technologies.

The Naval Research Laboratory

- **Provides primary in-house research for the physical, engineering, space, and environmental sciences**
- **Provides broadly based exploratory and advanced development programs in response to identified and anticipated Navy needs**
- **Provides broad multidisciplinary support to the Naval Warfare Centers**
- **Provides space and space systems technology development and support**
- **Assumes responsibility as the Navy's corporate Laboratory**


SECRETARY OF THE NAVY
CHIEF OF NAVAL OPERATIONS
ASSISTANT SECRETARY OF THE NAVY (Research, Development, and Acquisition)
NAVAL AIR SYSTEMS COMMAND
NAVAL SEA SYSTEMS COMMAND
SPACE AND NAVAL WARFARE SYSTEMS COMMAND
CHIEF OF NAVAL RESEARCH
NAVAL AIR WARFARE CENTER
NAVAL UNDERSEA WARFARE CENTER
NAVAL SURFACE WARFARE CENTER
NAVAL COMMAND, CONTROL, AND OCEAN SURVEILLANCE CENTER
NAVAL RESEARCH LABORATORY

The Naval Research Laboratory in the Department of the Navy

The Naval Research Laboratory is the Department of the Navy‘s corporate laboratory; it is under the command of the Chief of Naval Research (CNR). As the corporate laboratory of the Navy, NRL is the principal in-house component in the Office of Naval Research’s effort to meet its science and technology responsibilities.

NRL has had a long and fruitful relationship with industry as a collaborator, contractor, and most recently in Cooperative Research and Development Agreements (CRADAs). NRL values this linkage and intends for it to continue to develop.

NRL is an important link in the Navy RD&A chain. Through NRL, the Navy has direct ties with sources of fundamental ideas in industry and the academic community throughout the world and provides an effective coupling point to the R&D chain for the Office of Naval Research (ONR).

NRL Functional Organization

COMMANDING OFFICER
Code 1000
CAPT B.W. Buckley, USN

DIRECTOR OF RESEARCH
Code 1001
Dr. T. Coffey

CHIEF STAFF OFFICER
Code 1002
CAPT G.G. Brown, USN

- Safety
- Security
- Flight Detachment
- MILOPS
- MILPERS
- Management Control and Review
- Public Affairs

HUMAN RESOURCES OFFICE
Code 1800
Ms. B.A. Duffield*

- Equal Employment Opportunity
- Staffing and Classification
- Employee Development
- Employee Relations

BUSINESS OPERATIONS
Code 3000
Mr. D.K. Therning*

- Legal Counsel
- Contracts
- Financial Management
- Supply
- Research and Development Services
- Chesapeake Bay Section

MATERIALS SCIENCE AND COMPONENT TECHNOLOGY
Code 6000
Dr. B.B. Rath

- Laboratory for Structure of Matter
- Chemistry
- Materials Science and Technology
- Laboratory for Computational Physics and Fluid Dynamics
- Plasma Physics
- Electronics Science and Technology
- Center for Bio/Molecular Science and Engineering

NAVAL CENTER FOR SPACE TECHNOLOGY
Code 8000
Mr. P.G. Wilhelm

- Space Systems Development
- Spacecraft Engineering

SYSTEMS
Code 5000
Dr. R.A. LeFande

- Signature Technology Office
- Technical Information
- Radar
- Information Technology
- Optical Sciences
- Tactical Electronic Warfare

OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY
Code 7000
Dr. E.O. Hartwig

- Research Support Services
- Acoustics
- Remote Sensing
- Oceanography
- Marine Geosciences
- Marine Meteorology
- Space Science

*Acting

Current Research

The following areas represent broad fields of NRL research. Under each, more specific topics that are being investigated for the benefit of the Navy and other sponsoring organizations are listed. Some details of this work are given in the *NRL Review*, published annually. More specific details are published in reports on individual projects provided to sponsors and/or presented as papers for professional societies or their journals.

Advanced Radio, Optical, and IR Sensors

- Advanced optical sensors
- EO/MET sensors
- Satellite meteorology
- Precise space tracking
- Radio/Infrared astronomy
- Infrared sensors and phenomenology
- Middle atmosphere research
- Image processing
- VLBI/Astrometry
- Atmospheric effects on low frequency EM communications
- Optical interferometry
- Imaging spectrometry

Computer Science and Artificial Intelligence

- Standard computer hardware, development environments, operating systems, and run-time support software
- Methods of specifying, developing, documenting, and maintaining software
- Human-computer interaction
- Intelligent systems for resource allocation, signal identification, operational planning, target classification, and robotics
- Parallel scientific libraries
- Algorithms for massively parallel systems
- Digital progressive HDTV for scientific visualization
- High-performance, all-optical networking
- Machine learning
- Advanced computer networking
- Simulation management software for networked high performance computers
- Algorithms for incorporating environment and communication systems performance into simulations
- Interactive 3-D visualization tools and applications
- Distributed interactive simulations
- Computational steering

Directed Energy Technology

- High-energy lasers
- Chemical lasers
- Laser propagation
- High-power microwave sources
- RAM accelerators
- Pulse detonation engines
- Charged-particle devices
- Pulse power
- DE effects

Electronic Electro-optical Device Technology

- Integrated optics
- Radiation-hardened electronics
- Nanotechnology
- Microelectronics
- Microwave and MM wave technology
- Hydrogen masers for GPS
- Aperture syntheses
- Electric field coupling
- Vacuum electronics
- Focal plane arrays
- Infrared sensors

Electronic Warfare

- EW/C2W/IW systems and technology
- COMINT/SIGINT technology
- EW decision aids, and planning/control systems
- Intercept receivers, signal processing, and identification systems
- Passive direction finders
- Decoys and offboard CM (RF and IR)
- Expendable autonomous vehicles
- Repeaters/jammers and EO/IR active countermeasures and techniques
- Platform signature measurement and management
- Threat and EW systems computer modeling and simulations
- Visualization and virtual reality
- Hardware-in-the-loop and flyable simulators
- Missile warning infrared countermeasures
- RF environment simulators
- EO/IR multispectral/hyperspectral surveillance

Enhanced Maintainability, Reliability, and Survivability Technology

- Coatings
- Friction/wear reduction
- Water additives and cleaners
- Fire safety

- Laser hardening
- Satellite survivability
- Corrosion control
- Automation for reduced manning
- Radiation Effects
- Mobility fuels
- Chemical and biological sensors
- Environmental compliance

Environmental Effects on Naval Systems

- Meteorological effects on electro-magnetic/ electro-optical system performance
- Meteorological effects on weapons, sensors, and platforms
- Air quality in confined spaces
- Electromagnetic background in space
- Solar and geomagnetic activity
- Magnetospheric and space plasma effects
- Nonlinear science
- Ionospheric behavior
- Oceanographic effects on weapons, sensors, and platforms
- Electromagnetic, electro-optical, and acoustic system performance/optimization
- Environmental hazard assessment
- Contaminant transport

Imaging Research/Systems

- Remotely sensed signatures analysis
- Real-time signal and image processing algorithms/systems
- Image data compression methodology
- Image fusion
- Automatic target recognition
- Scene/Sensor noise characterization
- Image enhancement/noise reduction
- Scene classification techniques
- Radar and laser imaging systems studies
- Coherent/Incoherent imaging sensor exploitation
- Remote sensing simulation
- Hyperspectral imaging
- Microwave polarimetry

Information Technology

- Antijam communication links
- Next generation, signaled optical network architectures
- Integrated voice and data
- Arctic communication links
- Information security (INFOSEC)
- Voice processing
- High performance computing
- High performance communications
- Requirement specification and analysis
- Real-time computing
- Tactical/warfighter's internetworking
- Natural environments for distributed simulation
- Collaborative engineering environments
- Information filtering and fusion
- Integrated internet protocol (IP) and asynchronous transfer mode (ATM) multicasting
- High assurance software
- Distributed network-based battle management
- Teraflop scalable shared memory, massively parallel computer architectures
- Distributed, secure, and mobile information infrastructures
- Virtual engineering
- Simulation based virtual reality
- Advanced distributed simulation
- High-end, progresive HDTV imagery distribution
- Defensive information warfare
- Augmented reality

Marine Geosciences

- Geoacoustic modeling in support of acoustic performance prediction
- Marine seismology, including propagation and noise measurement
- Geomagnetic modeling in support of nonacoustic system performance prediction
- Geotechnology/sediment dynamics affecting mine warfare and mine countermeasures
- Mapping and charting, including advanced seafloor mapping, imaging systems, and innovative object-oriented digital mapping models, techniques, and databases
- Static potential field measurement and analysis (gravity and magnetic)
- Foreshore sediment transport

Materials

- Superconductivity
- Magnetism
- Bio / Molecular engineering
- Materials processing
- Advanced alloy systems
- Solid free form fabrication
- Environmental effects
- Energetic materials / explosives
- Aerogels
- Nano-scale materials
- Non-destructive evaluation
- Ceramics and composite materials
- Thin film synthesis and processing
- Electronic and piezoelectric ceramics
- Thermoelectric materials
- Metamorphic materials / smart structures
- Computational material science
- Paints and coatings
- Flammability

Meteorology

- Global, theater, tactical-scale, and on-scene numerical weather prediction
- Data assimilation and physical initialization
- Atmospheric predictability and adaptive observations
- Adjoint applications
- Marine boundary layer characterization
- Air/sea interaction; process studies
- Coupled air/ocean/land model development
- Tropical cyclone forecasting aids
- Satellite data interpretation and application
- Aerosol transport modeling
- Meteorological applications of artificial intelligence and expert systems
- On-scene environmental support system development
- Tactical data base development and applications
- Meteorological tactical decision aids
- Meteorological simulation and visualization

Ocean Acoustics

- Underwater acoustics, including propagation, noise, and reverberation
- Fiber-optic acoustic sensor development
- Deep ocean and shallow water environmental acoustic characterization
- Undersea warfare system performance modeling, unifying the environment, acoustics, and signal processing
- Target reflection, diffraction, and scattering
- Acoustic simulations
- Tactical decision aids
- Sonar transducers

Oceanography

- Oceanographic instrumentation
- Open ocean, littoral, and nearshore oceanographic forecasting
- Shallow water oceanographic effects on operations
- Arctic environmental quality
- Modeling, sensors, and data fusion
- Bio-optical and fine-scale physical processes
- Bio-corrosion
- Oceanographic simulation and visualization
- Coastal scene generation
- Waves, tides, and surf prediction
- Coupled model development
- Coastal ocean characterization
- Oceanographic decision aids
- Global, theater, and tactical scale modeling
- Remote sensing of oceanographic parameters
- Satellite image analysis

Space Systems and Technology

- Space and ground systems implementation, from concept through orbital operations
- Advanced space systems architectures and requirements
- Systems engineering and analysis
- Mission evaluation and performance assessment
- Spacecraft controllers, processors, signal processing, and software
- Astrodynamics, mathematical modeling, and simulations
- Surveillance sensing technology and applications
- Satellite communications theory and systems
- Tactical communications systems
- Mobile data collection, processing, and dissemination
- Spacecraft electronics design, engineering, and integration
- Satellite ground station, tracking, telemetry, control systems design, and software
- Precise time and time interval technology
- Navigation satellite technology and frequency standards
- Remote sensing, calibration, and research
- Spacecraft electrical power and radio frequency systems

Surveillance and Sensor Technology

- Point defense technology
- Imaging radars
- Surveillance radars
- Multifunction RF systems
- Target classification/identification
- Airborne geophysical studies
- Fiber-optic sensor technology
- Undersea target detection/classification
- EO/IR multispectral/hyperspectral detection and classification
- Sonar transducers
- Electromagnetic sensors—gamma ray to rf wavelengths
- SQUID for magnetic field detection
- Low observables technology
- Ultra-wideband technology
- VHSIC/MIMIC applications
- Interferometric imagery
- Micro-sensor system
- Digital framing resonnaissance canvas

Undersea Technology

- Autonomous vehicles
- Bathymetric technology
- Anechoic coatings
- Acoustic holography
- Unmanned undersea vehicle dynamics
- Weapons launch

Major Research Capabilities and Facilities
(Listed alphabetically by organizational unit)

Acoustics Division (Code 7100)

- Large, sandy-bottom, holographic pool facility for investigating echo characteristics of underwater buried / near bottom targets and sediment acoustics
- Multichannel programmable acoustic signal processing system
- Containerized data processing for acoustic array processing at remote sites and aboard ship
- One million gallon, vibration-isolated underwater holographic / 3-D laser vibrometer facility for studying structural acoustic phenomena for submarine, mine countermeasure and torpedo systems
- In-air structural acoustics facility with high spatial density nearfield acoustic holography and 3-D laser vibrometer measurements and processing systems for diagnosing large structures including aircraft interiors and rocket payload fairings
- High-powered sound source array
- Moored acoustic array with satellite telemetry channels for measuring directional noise
- Multiple-towed acoustic arrays with up to 144 acoustic channels for measuring directional noise
- Twin underwater towers supporting sources and hydrophone arrays to measure high-frequency propagation, volume, and boundary scattering in shallow water
- High-speed maneuverable towed body with MK-50 and synthetic aperture sonars to measure high-frequency boundary scattering and coherence
- Tactical oceanography simulation laboratory
- Digital Acoustic Buoy Systems (DABS), which can autonomously record data from vertical and/or horizontal acoustic arrays, providing the capability to (1) make long-term ambient noise measurements uncontaminated by the noise of a nearby ship and (2) make single ship propagation measurements
- Acoustic Communications Simulation Laboratory
- 20-ft by 20-ft by 10-ft deep above-ground saltwater acoustic tank facility with environmental control and substantial optical access

Center for Bio/Molecular Science and Engineering (Code 6900)

- Optical equipment
  - Confocal fluorescent microscope
  - CW fluorimeter and microscope
  - Excimer laser projection exposure system
  - Dektak surface profilometer
  - Optical and fluorescence microscopes
  - Photon correlation spectrometer
  - Picosecond dye laser system
  - Raman spectrometers
  - Scanning and transmission electron microscope
  - SLM fluorimeter (visible through near IR)
  - Time resolved fluorimeter (nanosecond)
  - UV-visible absorption spectrophotometers
- Analytical instruments
  - Atomic force/scanning tunnelling microscope
  - Capillary electrophoresis unit
  - Contact angle goniometer
  - Differential scanning calorimeter
  - GC/MASS spectrometer
  - DNA synthesizer; DNA sequencer
  - HPLC
  - Patch clamp microelectrodes
  - Potentiometer for electrochemistry
- General facilities
  - Class 100 clean room
  - Cold room for storage and preparation
  - Controlled shelf temperature lyophilizer
  - Silicon graphics IRIS workstation
  - Freeze-fracture apparatus
  - High-speed ultracentrifuges
  - Inert atmosphere dry box
  - Langmuir-Blodgett film balance

Chemistry Division (Code 6100)

- Synthesis/processing facilities
  - Marine corrosion facility (at Key West, Florida)
  - Paint formulation and coating
  - Functional polymers/elastomers
  - Langmuir-Blodgett film
  - Surface cleaning
  - Thin film deposition /etching with in-situ control
- Characterization facilities
  - General purpose chemical analysis
  - Surface diagnostics
  - Nanometer scale composition/structure/properties
  - Magnetic resonance NDI
  - Tribology
  - Polymer structure/function
- Special purpose capability

Environmental monitoring/remediation
Synchrotron interfacial spectroscopy/ structure
Combustion and fire research
Alternate and petroleum-derived fuels
Simulation/modeling
Synchrotron radiation beam lines (at NSLS, Brookhaven, NY)
Raman Spectroscopic Laboratory

Electronics Science and Technology Division (Code 6800)

Nano- and micro-electronics characterization and processing facilities
Electron-beam nanowriter
High-resolution transmission electron microscope
Scanning tunneling microscopy and electro-optical analysis
Crystal-growing facilities including bulk growth, molecular beam expitaxy, and organo-metallic chemical vapor deposition
Optical and electrical characterization of materials
Electronic testing and analysis facilities
Vacuum electronics engineering facility

Information Technology Division (Code 5500)

HF modem and channel simulation
Brandywine antenna range
Pomonkey test range
CBD Ship Motion Simulator
Signal analysis laboratory
Artificial intelligence computer network
HCI laboratory
Certification and INFOSEC engineering laboratory
Virtual reality laboratory
DoD High Performance Computing Modernization Program (HPCMP) Distributed Center (DC)
High-speed ATM network (backbone and to the desktop)
ATD net Washington area pop for high performance, multi-gigabit optical streams
Distributed file systems with authentication (Andrew File System / Multi-Resident Andrew File System (AFS / MRAFS))
Lab-wide network, NICEnet, providing computer communications, video services, and gateways to networks and computer systems worldwide
Satellite dishes for video and data reception
File server/archiver system for central file storage of lab-wide data
Visualization laboratory
Lab-wide ADP training facility
Navy engagement warfare assessment and virtual engineering (newave) research center
NATO Improved Link-Eleven (NILE) Test Bed

Laboratory for Computational Physics and Fluid Dynamics (Code 6400)

Six-processor SGI Power Onyx workstation
Eighteen-processor SGI Power Challenge
Twenty-four processor SGI Origin 2000
Thirty-two processor SGI Origin 2000
Sixty-four processor HP Exemplar
Sixteen-processor HP Exemplar
D2 Digital video and animation laboratory
SUN Microsystems 670MP workstation server
Over sixty SUN, SGI, and MACINTOSH workstations
Three-fourths terabyte RAID Disk Storage Systems
All computers and workstations have network connections to NICENET and ATDNET allowing access to the NRL CCS facilities (including the DoD HPC resources) and many other computer resources both internal and external to NRL.

Laboratory for Structure of Matter (Code 6030)

Two area detector systems
Two X-ray diffractometers
Zymark robotics
Four silicon graphics IRIS workstations
Protein and peptide chromatography
Atomic force microscope

Marine Geosciences Division (Code 7400)

Airborne gravimetry, magnetics, and topographic measurements suite coupled with differential GPS yielding position accuracies of <1.0 meter
Deep-towed acoustic geophysical system operating at 250-650 Hz characterizes subseafloor structure including gas clathrate accumulations and dissociation of methane hydrates
Acoustic seafloor classification system operating at 15-50 kHz provides underway, real-time prediction of sediment type and consistency
Seafloor probes for measuring sediment pore water pressures and acoustic compressional and shear wave velocities and attenuations
100 and 300 kV transmission electron microscopes with environmental cell for study of

sediment fabric, especially impact of organics
Object-oriented digital cartographic modeling techniques and databases with Internet access
Map data formatting facility compresses map information onto compact disk-read only memory media for masters for use in aircraft digital moving map systems
ORCA and RMSO radio controlled semi-submersible mapping systems
Magnetic observatory conducts measurements of ambient field and other magnetic phenomena
Comprehensive geotechnical and geoacoustics laboratory capability
Airborne ElectroMagnetic (AEM) bathymetry system
Ocean bottom magnetometer system
3-D, multi-spectral, subbottom swath imaging system
Ocean Bottom Seismographs (OBS)
In-Situ Sediment Acoustic Measurement System (ISSAMS)
Hydrothermal plume imaging data acquisition and analysis system
Integrated digital databases analysis and display system for bathymetric, meteorological, oceanographic, geoacoustic, and acoustic data
Stereometric video image processing system for use in foreshore morphology measurement
Sediment gas-content sampler
Acoustic tomographic probes for surf zone sands
Surf zone sediment penetrometer

Marine Meteorology Division (Code 7500)

Tactical Environmental Support System (TESS) for fielding regional and shipboard METOC applications
SMQ-11 shipboard antenna system for retrieving polar-orbiting satellite data
Geostationary satellite data direct readout and processing center
Super-workstations for numerical weather prediction systems development
Master Environmental Library (MEL) implemented on super-workstations for archiving and distributing real-time and historical atmosphere/ocean data bases
Bergen Data Center for extensive file serving and research data backup / archival capability
Data visualization center for developing shipboard briefing tools, displaying observations and model output, and integrating meteorological parameters into tactical simulations

Materials Science and Technology Division (Code 6300)

Ultrasonic gas atomizer
Hot isostatic press
Cold isostatic press
High-energy, dispersive X-ray analytical system
Electron microprobe, SEM, SAM, and STEM systems
Quantitative metallography
Computer-controlled multiaxial loading and SCC measurement systems
Computer-interactive, nonlinear, multimode fracture measurement system
Computer-aided, experimental stress analysis
Crystallite Orientation Distribution Function (CODF)
Thermoelectric parametric measurement system
Class 1000 clean room; processing metallic film
Elevated temperature and structural characterization laboratory
Nondestructive evaluation laboratory
Closed-loop, low- and high-cycle fatigue systems
Metallic film deposition systems
Magnetometry
Mossbauer spectroscopy
Cryogenic facilities
High-field magnets
High-resolution analytical electron microscope
Isothermal heat treating facility
Vacuum arc melting facility
Vacuum induction melting facility
3-MeV tandem Van de Graaff accelerator
200-keV ion-implantation facility
Microwave test facility
Excimer laser film deposition facility
Bomen infrared spectrometer facility
Diffuse light scattering facility
Femtosecond laser facility
Semiconductor assessment facility
Surface characterization facility

Oceanography Division (Code 7300)

Towed sensor and advanced microstructure profiler systems for studying upper ocean fine and micro-structure
Integrated absorption cavity and optical profiler systems for studying ocean optical characteristics
Environmental scanning electron microscope and confocal laser scanning microscope for detailed studies of bio-corrosion in naval materials
Self-contained bottom mounted upwardlooking acoustic profilers for measuring ocean variability
Acoustic doppler profiler for determining ocean

currents while under way
Remotely operated underwater vehicle (ROV)
Bottom mounted acoustic doppler profilers
Towed hyperspectra optical array
SCI Processing Facility
Satellite Receiving Stations for AVHRR, SeaWifs, DMSP Ocean Color Processing Facility

Optical Sciences Division (Code 5600)

Electron-beam, electron-beam sustained, X-ray, and UV preionized laser devices with spectroscopic and other diagnostic equipment
Short-pulse excitation apparatus for kinetic mechanisms investigations
IR laser facility for optical characterization of semiconductors
Mobile, high-precision optical tracker
Facilities for synthesis and characterization of optical glass compositions and for the fabrication of optical fibers
Optical and digital image processing facilities
Silica and IR fluoride/chalcogenide fiber fabrication facilities
Facilities for fabricating and testing integrated optical devices
Optical probes laboratory to study viscoelastic, structural, and transport properties of molecular systems
Computer IR/EO technology/systems simulation center
High-energy pulsed chemical laser laboratory
Laser diode pumped 10 W 2 μm solid state lasers
Field-qualified EO/IR measurements devices
Focal plane array evaluation facility
Mid-IR, low phonon crystal growth facility
Onyx-based multispectral image processing facility
Indoor IR test range
NRL P-3 aircraft sensor pallet
EO/IR high-resolution sensors
IRCM
Common data link
Infrared countermeasure techniques laboratory
Multi and hyperspectral sensors and processing
Response of fiber-optic hydrophone as a function of temperature and pressure
Environmental testing of fiber sensors (acoustic, magnetic, electric field, etc.)
High-speed, high-power photodetector characterization
Communication link characterization to >100 Gbps
RF phase noise, noise figure, and network analysis

Plasma Physics Division (Code 6700)

PAWN, 1-MJ compact inductive storage facility
Gamble II high-voltage pulsed power generators
HAWK, 1 MA inductive storage facility
PHAROS III, three-beam neodymium-glass laser and target facility
Table-Top Terawatt (T^3) laser system
NIKE krypton fluoride laser facility
High-power relativistic klystron and gyrotron facilities
Large volume space chamber (2 m × 5 m)
Large area plasma processing system
Microwave facility for processing of advanced materials (2.45, 35, 94, and 60-120 GHz)

Radar Division (Code 5300)

Airborne research radar facility, including advanced profile high-resolution imaging radar and P3 (1998) with APS-145 Group 2t and CEC
Ship radar-cross-section computer prediction facility
Electromagnetic numerical computation facility
Shipboard radar research and development test beds:
1. Senrad wideband air surveillance radar facility
2. Volume surveillance radar test bed
3. Ship self-defense surveillance and engagement demonstration systems

Cooperative aircraft identification (IFF) ground station facility
Shipboard radar display facility
Compact range antenna measurement laboratory
Experimental mode-stirred chamber for electromagnetic compatibility qualification
CBD fleet radar systems facility
Space-time adaptive processing laboratory
Electronic computer-aided design facility
Clutter research radar

Remote Sensing Division (Code 7200)

Polar ozone and aerosol monitor space sensor
Ground-based stratospheric water-vapor monitoring system
SAR processing facility
SCI processing facility
SEALAB
NASE LAB
Hyperspectral imaging, sensors, and processing
Optical remote sensing calibration lab / facility
Navy prototype optical interferometer
NRL / NRAD 74 MHz very large array
Free surface hydrodynamics laboratory

- SSM/I processing facility
- STEMS system
- Ocean tower/platform/ship radar
- Volume Imaging Lidar system
- Aerosol and field measurement facility
- Airborne Polarimetric Microwave Imaging Radiometer (APMIR)
- NRL RP-3A aircraft sensors
  - Airborne Lidar
  - MMW imagers
  - DMSP SSM/I simulator
  - PRT-5 IR radiometer
  - Imaging real-aperture radar (RAR)
  - Flight-level meteorological sensors
  - Hyperspectral sensor systems (PHILLS)
  - Ultra wideband SAR (NUSAR)

Research and Development Services Division (Code 3500)

- Military construction
- ONR facilities support
- Research support engineering
- Planning
- Full range of facility contracting, including construction, architect/engineering services, facilities support, and base operating services
- Transportation
- Telephone services
- Maintenance and repair of buildings, grounds, and communication and alarm systems
- Shops for machining, sheet metal, welding, and plating

Spacecraft Engineering Department (Code 8200)

- Chambers:
  - Thermal-vacuum
  - Acoustic reverberation
- Facilities:
  - Shock and vibration test
  - Clean-rooms
  - Spacecraft-fabrication and assembly
  - Fuels test
  - Autoclave
  - Rotary air bearing
  - CAD/CAM
  - Automatic welding
  - Static loads test
  - Spacecraft spin balance
  - Modal analysis

Space Science Division (Code 7600)

- E.O. Hulburt Center for Space Research
- Development and test facilities for spaceborne instruments to perform astrophysical, solar, high-atmospheric, and space-environment sensing
- Clean-room facilities
- Extensive computer-assisted data manipulation and interpretive capability for space-data imaging and modeling
- Backgrounds Center of Expertise (BCoE)
- Ballistic Missile Defense Organization (BMDO)
- Synthetic Scene Generation Model (SSGM)
- Backgrounds Data Center for analysis of BMDO-relevant natural backgrounds
- Special Sensor Ultraviolet Limb Imager (SSULI) calibration facility
- Ultraviolet remote sensing data center
- Low-temperature laboratory
- Gamma Ray Observatory (OSSE) operations and data analysis center
- Solar instrument test facility
- Solar Ultraviolet Spectral Irradiance Monitor (SUSIM) operations and data analysis center
- Large Angle Spectrometric Coronagraph (LASCO) operation and data analysis
- Extreme-ultraviolet Imaging Telescope (EIT)
- Middle Atmosphere High Resolution Spectrograph Investigation (MAHRSI) to measure OH and NO in middle atmosphere

Space Systems Development Department (Code 8100)

- Payload test facility and processor development laboratory
- Spacecraft high-reliability electronic and electrical production facility
- Spacecraft electronic systems integration and test facility
- Spacecraft electrical power systems and battery laboratories
- Laser physics and electro-optics laboratories
- Tactical Technology Development Laboratory (TTDL)
- Electromagnetic interference/electromagnetic computability (EMI/EMC) screen room test facility
- Precision oscillator (clock) test facility
- Radio frequency (RF) system development facility
- RF microcircuit fabrication cleanroom facility
- Large tapered horn RF anechoic chamber facility
- RF payload development laboratory with anechoic chamber
- Precision high-frequency RF compact range anechoic chamber facility
- Transportable ground station development, assembly, and test facility

Satellite telemetry, tracking and control facilities
Pomonkey Field Site/large antenna, space communications, and research facility
Midway Research Center/space communications and research facility

Tactical Electronic Warfare Division (Code 5700)

Mobile infrared signature measurement and simulation facility
Mobile ESM laboratory
Hybrid RF/IR missile-seeker simulation facility
Central target simulation facility for developing, testing, and evaluating EW systems and techniques, using real-time, hardware-in-the-loop models
RF simulation laboratory and signal simulators
Radar cross-section measurement facility (at CBD)
Search radar ECM simulator
Advanced tactical EW environment simulator
Electronic warfare coordination test bed
Scale-model analysis facility
Wind tunnel for performance measurements of low Reynolds number vehicles
Optical integration laboratory
Tempest signal-processing laboratory
Simulated ship-mast facility
Secure supercomputer facility
Vehicle development laboratory
Visualization laboratory

Technical Information Division (Code 5200)

History Office
NARDIC (Naval Acquisition, Research, and Development Information Center)
Ruth H. Hooker Research and Technical Information Center:
On-line catalog of unclassified publications
LAN-based catalog of classified and unclassified publications
Web-access to journals, reports, press releases, NRL publications
Digital library projects with association, commercial, and government publishers
Consortial relationship with NIST, NASA Goddard Space Flight Center, NSA
Writing, editing, and publication services
Graphic design and printing services
Imaging Center
Photographic laboratory
NRL Exhibit Program: display, design, production
Multimedia design and production
Video editing suite
Scientific and technical photography
Auditorium services
Mail handling services
Correspondence review and archives services
Forms Supply Store
Electronic forms and forms design

NRL Sites and Facilities

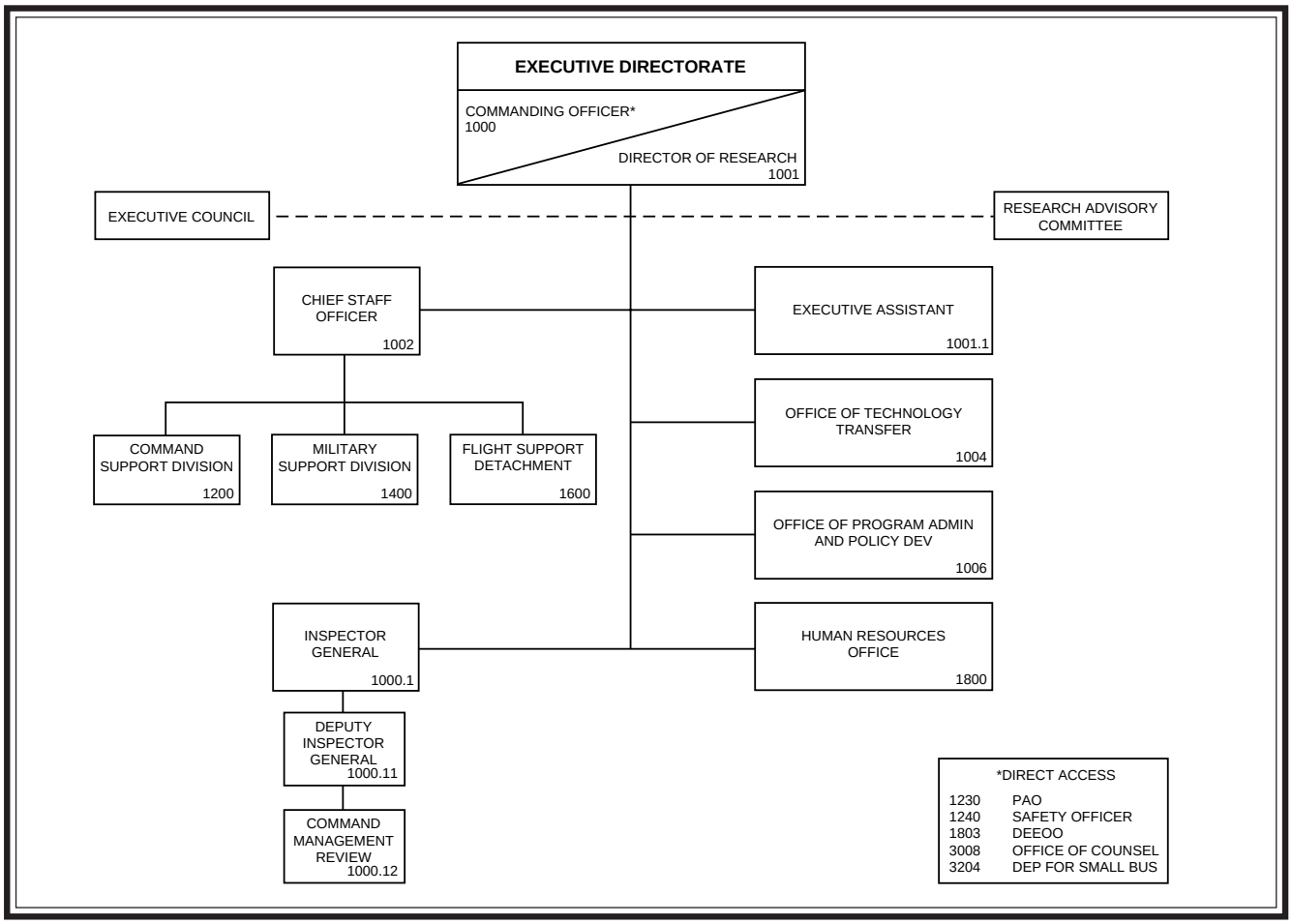
SITE	ACREAGE		BUILDINGS/ STRUCTURES
	LAND OWNED/LEASED	EASEMENT/ LICENSE-PERMIT	
District of Columbia			
NRL and Artificial Intelligence Center at Bolling AFB	131/0	0/10.24	107/25
Virginia			
Midway Research Center Quantico	162/0		9/1
Maryland			
NRL Flight Support Detachment, NAS Patuxent River*	Tenant		
Chesapeake Bay Section and Dock Facility Chesapeake Beach*	157/0	0/0.60	62/87
Multiple Research Site Tilghman Island*	2/0		3/3
Radio Astronomy Observatory Maryland Point*	24/0		10/16
Radio Antenna Range USAF Receiver Site Brandywine*	0/0	0/22.98	1/0
Free Space Antenna Range Pomonkey*	56/0	28.40/0	9/11
Florida			
Marine Corrosion Facility Key West	Tenant		
California			
NRL Monterey Monterey*	Tenant		
Mississippi			
Stennis Space Center Bay St. Louis*	Tenant		
Alabama			
Ex-USS *Shadwell* (LSD-15) Mobile Bay	Tenant		
	Decommissioned 457-ft vessel used for fire research		

PROPERTY

Land:		**Buildings:**		**Replacement Costs:**	
Owned	556 acres	RDT&E	3,167,125 ft^2	Real property – current	
Leased	0 acres	Administrative	225,812 ft^2	Replacement value	$964.5 million
		Other	422,367 ft^2	Equipment	$186.7 million

*See maps in the General Information section (page 137).

Executive Directorate



Key Personnel

Name	Title	Code
CAPT B.W. Buckley, USN	Commanding Officer	1000
Dr. T. Coffey	Director of Research	1001
Mr. D.J. DeYoung	Executive Assistant	1001.1
CAPT G.G. Brown, USN	Chief Staff Officer / Inspector General	1002 / 1000.1
Mr. J.C. Payne	Head, Command Support Division / Deputy Inspector General	1200 / 1000.11
Ms. B. Peters	Command Management Review	1000.12
Dr. C.M. Cotell	Head, Office of Technology Transfer	1004
Mrs. L.T. McDonald	Head, Office of Program Administration and Policy Development	1006
Mr. R.L. Thompson*	Head, Public Affairs Branch	1230
Vacant	Head, Safety Branch	1240
CDR A. Leigh, USN	Head, Military Support Division	1400
CDR T. McMurry, USN	Officer in Charge, Flight Support Detachment	1600
Ms. B.A. Duffield*	Director, Human Resources Office	1800
Ms. D.E. Erwin	Deputy Equal Employment Opportunity Officer	1803
Mr. J. McCutcheon	Head, Office of Counsel	3008
Ms. L. Byrne	Deputy for Small Business	3204

*Acting

EXECUTIVE DIRECTORATE

Code 1000 and Code 1001

The Commanding Officer (Code 1000) and the Director of Research (Code 1001) share executive responsibility for the management of the Naval Research Laboratory. In accordance with Navy requirements, the Commanding Officer is responsible for the overall management of the Laboratory and exercises the usual functions of command including compliance with legal and regulatory requirements, liaison with other military activities, as well as the general supervision of the quality, timeliness, and effectiveness of the technical work and of the support services.

The Commanding Officer delegates line authority and assigns responsibility to the Director of Research for the technical program, its planning, conduct, and staffing; evaluation of the technical competence of personnel; liaison with the scientific community; selection of subordinate technical personnel; exchange of technical information; and the effective execution of the NRL mission.

Within the limits of Navy regulations, the Commanding Officer and the Director of Research share authority and responsibility for the internal management of the Laboratory. The Commanding Officer retains all authority and responsibility specifically assigned to him by higher authority.

The mission of the Laboratory is carried out by three science and technology directorates and the Naval Center for Space Technology, supported by the Business Operations Directorate and the Executive Directorate. In addition, the Laboratory's operating staffs provide assistance in their special fields to the Commanding Officer and to the Director of Research. The operating staffs are listed on the following pages of this publication.

Commanding Officer

CAPT Bruce W. Buckley, USN, graduated from the United States Naval Academy in 1973. CAPT Buckley entered flight training and was designated a Naval Aviator in December 1974 at Naval Air Station Chase Field, Texas. After completing replacement pilot training in the F-14A at Fighter Squadron 124, he was assigned as an F-14A pilot in Fighter Squadron 24.

CAPT Buckley has accumulated extensive experience in research, development, engineering, and project management beginning with a tour on the Joint Test Force of the Air Combat/ Air-to-Air Missile Evaluation at Nellis Air Force Base, Nevada. He then attended the Naval Postgraduate School at Monterey, California, where he earned a Master of Science in Electrical Engineering with Distinction. While at postgraduate school, CAPT Buckley was selected to be designated an Aerospace Engineering Duty Officer (AEDO).

As an AEDO, CAPT Buckley has had positions of increasing responsibility in engineering and program management including F/A-18 F404 Project Officer at the Naval Plant Representatives Office, Lynn, Massachusetts; Avionics and Electro-Optics Projects Manager in the F/A-18 Program Management Office, Assistant to the Program Director of Tactical Aircraft Programs, F404 Engine Program Manager, and Program and Policy Branch Head in the Propulsion Division, all at the Naval Air Systems Command, Arlington, Virginia. CAPT Buckley then served in two positions, as the F-14 Aircrew Systems Program Manager and as the Deputy Director of the Research and Engineering Department of the Naval Training Systems Center in Orlando, Florida. Returning to Washington and the Naval Air Systems Command in July 1993, he served as the Director of the Propulsion and Power Division and the Executive Assistant to the Commander, Naval Air Systems Command. CAPT Buckley assumed command of the Naval Research Laboratory on January 26, 1996.

CAPT Buckley's decorations include the Legion of Merit, the Meritorious Service Medal, a Joint Service Commendation, and three Navy Commendations.

CAPT Buckley is married to the former Janice E. Faller of Miami, Florida, and they have two daughters, Michele and Sandra.

NRL's New Commanding Officer
August 6, 1999

Captain Douglas H. Rau, USN
Commanding Officer
Naval Research Laboratory

Captain Douglas H. Rau, born and raised in Mountainside, New Jersey, graduated from the United States Naval Academy in 1974. He participated in the Immediate Graduate Education Program at the University of Washington and then reported to Surface Warfare Officer School and qualified as a Surface Warfare Officer onboard the USS *Fox* (CG-33).

CAPT Rau continued his career serving in engineering, research, development, and project management related billets. In 1986, he transferred to the Engineering Duty Officer community.

Sea service assignments include:

USS *Fox* (CG-33)	Main Propulsion Assistant
USS *Rathburne* (FF-1057)	Chief Engineer
COMDESRON 35	Squadron Engineer
USS *Nimitz* (CVN-68)	Chief Engineer

Shore duty assignments include:

Pearl Harbor Naval Shipyard	Project superintendent for DD963 overhauls
PERA(CV)	Officer in Charge
Puget Sound Naval Shipyard	Engineering and Planning Department Head
CNO's Strategic Studies Group	Fellow
Bureau of Personnel	Engineering Duty Officer Community Manager
Naval Sea Systems Command	Executive Assistant

Education:

USNA	BS Ocean Engineering, graduate with distinction
U of Washington	Studies in Naval Architecture
Naval Postgraduate School	MS Mechanical Engineering, graduate with distinction
U of Pittsburgh	Management Program for Executives

CAPT Rau's decorations include the Legion of Merit, Meritorious Service Medal with one star, Navy Commendation Medal with one star, Navy Achievement Medal, and various unit citations and campaign ribbons.

CAPT Rau is married to the former Colette Greceldhes of Port Orchard, Washington. They have three daughters, Asia, Amber, and Alisa.

Director of Research

Dr. Timothy Coffey was born in Washington, DC, on June 27, 1941. He graduated from the Massachusetts Institute of Technology in 1962 with a B.S. degree in electrical engineering, and obtained his M.S. (1963) and Ph.D. (1967), both in physics, from the University of Michigan.

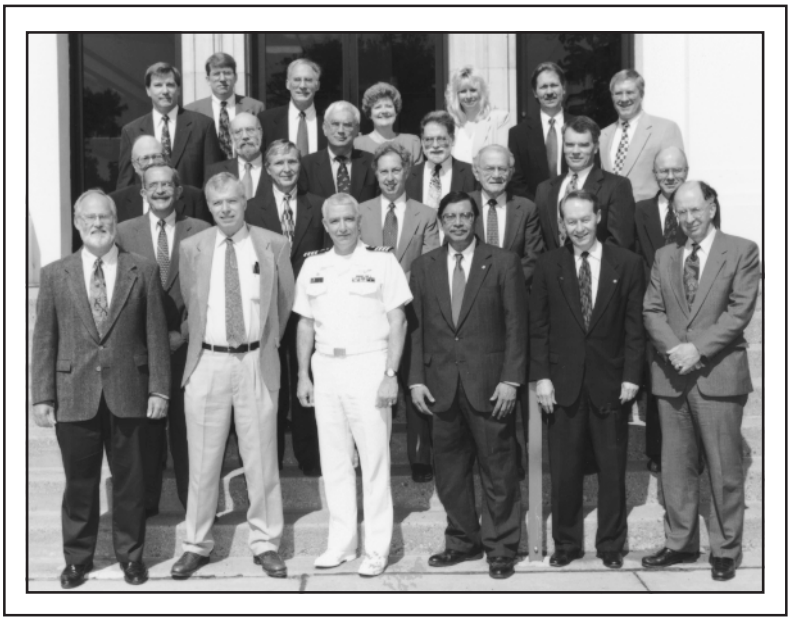
During his graduate career, Dr. Coffey worked as a research assistant at the University of California (1963-64), a research physicist at the Air Force Cambridge Research Laboratories (1964-65), and a teaching fellow and research assistant in physics at the University of Michigan (1965-66). As a scientific consultant for EG&G, Inc. (1966-71), he was involved in investigations in theoretical and mathematical physics.

Dr. Coffey came to the Naval Research Laboratory in 1971 as Head of the Plasma Dynamics Branch, Plasma Physics Division. In this position, he directed research in the simulation of plasma instabilities, the development of multidimensional fluid and magnetohydrodynamic codes, and the development of computer codes for treating chemically reactive flows. In 1975, he was named Superintendent, Plasma Physics Division; he was appointed Associate Director of Research for General Science and Technology on January 1, 1980. On November 28, 1982, he was named Director of Research.

Dr. Coffey is recognized as an authority on the theory of nonlinear oscillations and has played a major role in the national program on high-altitude nuclear effects. The author or co-author of over 70 publications and reports, he has made several fundamental contributions to the theory of electron beam / plasma interaction and to the understanding of plasma processes in the Earth's ionosphere.

Dr. Coffey is a fellow of the American Physical Society and of the Washington Academy of Sciences. He has been presented the following awards: Presidential Rank of Meritorious Executive, in 1981; Distinguished Presidential Rank, in 1987; Delmer S. Fahrney Medal, Franklin Institute, in 1991; DoD Distinguished Civilian Service, in 1991; Distinguished Presidential Rank, in 1994; and Senior Executives Association Professional Development League's 1995 Executives Excellence Award.

Executive Council



The Executive Council consists of executive, management, and administrative personnel. Executive Council members include:

Commanding Officer, Chairperson
Director of Research
Associate Directors of Research
Chief Staff Officer
Director, Naval Center for Space Technology
Heads of Divisions
Head, Laboratory for Structure of Matter
Head, Laboratory for Computational Physics and Fluid Dynamics
Head, Center for Bio / Molecular Science and Engineering
Director, Human Resources Office
Public Affairs Officer
Deputy Equal Employment Opportunity Officer
Head, Office of Program Administration and Policy Development
Safety Officer
Head, Office of Counsel

Research Advisory Committee

The Research Advisory Committee advises the Commanding Officer and the Director of Research on scientific programs and the administration of the Laboratory. The committee assists in planning the long-range scientific program, coordinating the scientific work, reviewing the budget, accepting or modifying problems, considering personnel actions, and initiating such studies as may be necessary or desirable. The membership consists of:

Director of Research, Chairperson
Commanding Officer
Associate Directors of Research
Chief Staff Officer (Observer)

CAPT G.G. BROWN, USN

Chief Staff Officer/Inspector General
Code 1002/1000.1

The Chief Staff Officer serves as the Deputy to the Commanding Officer and acts for the Commanding Officer in his absence. The Command Support Division (Code 1200), the Military Support Division (Code 1400), and the Flight Support Detachment (NAS Patuxent River, MD, Code 1600) report directly to the Chief Staff Officer. When directed, the Laboratory's Inspector General investigates, inspects, and/or inquires into matters that affect the operation and efficiency of NRL. These matters include but are not limited to: effectiveness, efficiency, and economy; management practices; and fraud and waste. He serves as principal advisor to the Commanding Officer on all inspection matters and audits and is the principal point of contact and liaison with all agencies outside NRL.

MR. R.L. THOMPSON*

Public Affairs Officer
Code 1230

The Public Affairs Officer (PAO) advises the Commanding Officer and Director of Research on public affairs matters, including external and internal relations, community outreach, and serves as the Commanding Officer's principal assistant in the area of public affairs. To do this, the PAO plans and directs a program of public information dissemination on official NRL activities. The PAO coordinates responses to requests from the news media and the public for unclassified information or materials dealing with the Laboratory, coordinates participation in community relations activities, and directs the NRL history and internal information programs. The PAO is also responsible for coordinating all actions within the Laboratory that respond to requirements of the Freedom of Information Act (FOIA).

MR. S. BURNS

Safety Officer
Code 1240

The Head of the Safety Branch acts as the Safety Officer and is the program manager for Occupational Safety and Health, Explosives Safety, Industrial Hygiene, Hazardous Material Control and Management, Radiological Safety, Non-Ionizing Radiation Safety, and Environmental Protection. The Safety Branch must ensure that the development, implementation, and maintenance of comprehensive safety and environmental compliance programs, in support of the Laboratory's unique areas of research and development, comply with the appropriate federal, state, Navy, and NRL regulations.

*Acting

MS. D.E. ERWIN

Deputy Equal Employment Opportunity Officer
Code 1803

The Deputy Equal Employment Opportunity Officer (DEEOO) is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. The DEEOO manages the discrimination complaint process and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, African American Employment, Asian-Pacific Islanders, American Indian Employment, Individuals with Disabilities, including Disabled Veterans). The DEEOO recruits quality candidates for those areas when underrepresentation exists. Duties also include reviewing, coordinating, and monitoring implementation of EEO policies and developing local guidance, directives, and implementation procedures for the EEO programs.

MR. J. MCCUTCHEON

Office of Counsel
Code 3008

The Office of Counsel is primarily responsible for providing legal services to NRL's management in all areas of general and administrative law, and intellectual property law. The Office reviews all procurement-related actions; reviews NRL scientific papers prior to publication; prepares patent applications and prosecutes the applications through the Patent and Trademark Office; defends against contract protests, other contract litigation, and personnel cases; and advises on other legal matters relating to technology transfer, personnel, fiscal, and environmental law. NRL Counsel also serves as legal advisor to the Commanding Officer and Director of Research.

Office of Program Administration and Policy Development

Code 1006

MRS. L.T. MCDONALD

Basic Responsibilities

The Office of Program Administration and Policy Development provides managerial, technical, and administrative support to the Director of Research (DOR) in such areas as program and policy development, intra-Navy and inter-Service Science and Technology (S&T) program coordination, liaison with other Navy, DoD and government activities on matters of mutual concern, and support to the Executive Directorate in planning and directing NRL's S&T (6.1, 6.2) program. Specific functions include: monitors and provides background information on technical and policy matters that come under the purview of the DOR; represents NRL, ONR, and / or the Navy on tri-Service or DoD-wide coordination matters; performs special studies or chairs ad hoc study groups regarding program decisions or policy positions; performs special studies involving major NRL programs and resource issues; provides administrative support in the areas of personnel, budget, facilities, equipment, and security; provides executive management information and analyses for various aspects of the S&T program effort; coordinates VIP visits to NRL; manages the NRL directives system; administers the NRL response to Congressional requests; maintains the NRL R&D achievements file; develops the S&T guidance for monitoring and reporting the NRL S&T program; responsible for the administration of NRL's various postdoctoral fellowship programs; and manages the Facility Modernization Program.

Personnel: 19 full-time civilian

Key Personnel

Name	Title	Code
Mrs. L.T. McDonald	Head	1006
Ms. L.S. Herrin	Head, Program Administration Staff	1006.1
Ms. L. Renfro	Head, GLSIP Program	1006.17
Ms. B. Murphy	Administrative Officer	1006.2
Vacant	Head, Management Information Staff	1006.3
Mr. E. Rank	Head, NRL Facilities Staff	1006.4
Ms. M.E. Barton	Head, Directives Staff	1006.5

Point of contact: Ms. B. Murphy, Code 1006.2, (202) 767-3082

Command Support Division

Code 1200
Staff Activity Areas

- Security
- Public Affairs
- Safety
- Fire Protection

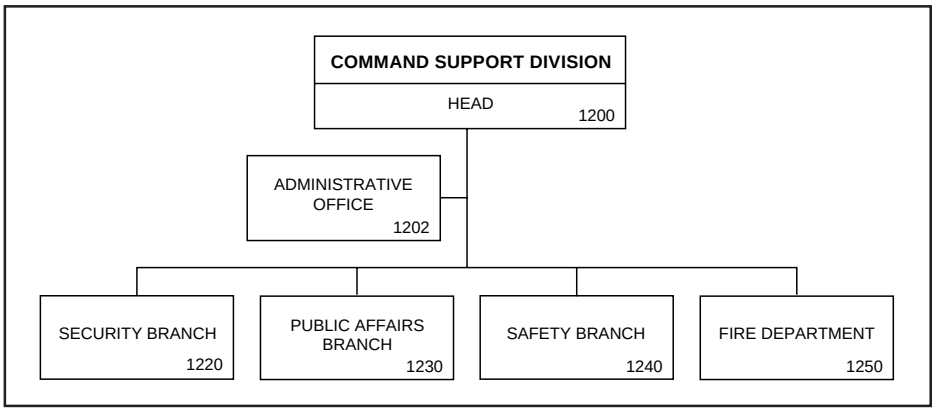
Public affairs

Security monitoring

Safety evaluation

Incoming visitor's reception area

MR. J.C. PAYNE



Basic Responsibilities

The Command Support Division provides civilian staff to the Commanding Officer and to the Director of Research. The Division is responsible for the Laboratory's physical, personnel, information, industrial and ADP security programs, communications service, fire protection, occupational safety, health and industrial hygiene, and environmental and public affairs. It provides intelligence support and support for international cooperative agreements in technology. The Division also coordinates the Laboratory's Management Control Program and provides liaison and coordination for all audit and inspection teams. In addition, administrative/budget supervision over the Military Operations Branch and the Patuxent River Flight Support Detachment is provided.

The Head of the Command Support Division is also the Deputy Inspector General. The Deputy Inspector General is responsible for day-to-day functioning of the office and its staff, program planning and execution and provides interface with outside agencies concerning inspections and audits conducted or to be conducted by NRL. These include Inspector General representatives from ONR, Navy, DoD, and GAO.

Personnel: 146 full-time civilian

Key Personnel

Name	Title	Code
Mr. J.C. Payne	Head	1200
Ms. M.A. Sepety	Administrative Officer	1202
Mr. J.T. Miller	Head, Security Branch	1220
Mr. R. Perry	Head, Information and Personnel Security Services Section	1221
Mr. C. Rogers	Head, Classification Management and Control Services Unit	1221.1
Ms. K. Coleman	Head, Personnel Security Services Unit	1221.2
Chief W.C. Edwards	Head, Guard Force	1222.2
Vacant	Head, Security Administration Services Unit	1222.3
Mr. J.T. Miller	Head, Special Security Section	1223
Ms. J. Gray	Head, SSO Services Unit	1223.1
Ms. J. Gray*	Head, Special Programs Security Services Unit	1223.2
Mr. R.L. Thompson*	Head, Public Affairs Branch	1230
Mr. S. Burns	Head, Safety Branch	1240
Mr. E. Stillwell	Fire Chief	1250

Point of contact: Ms. M.A. Sepety, Code 1202, (202) 767-3204

*Acting

Military Support Division

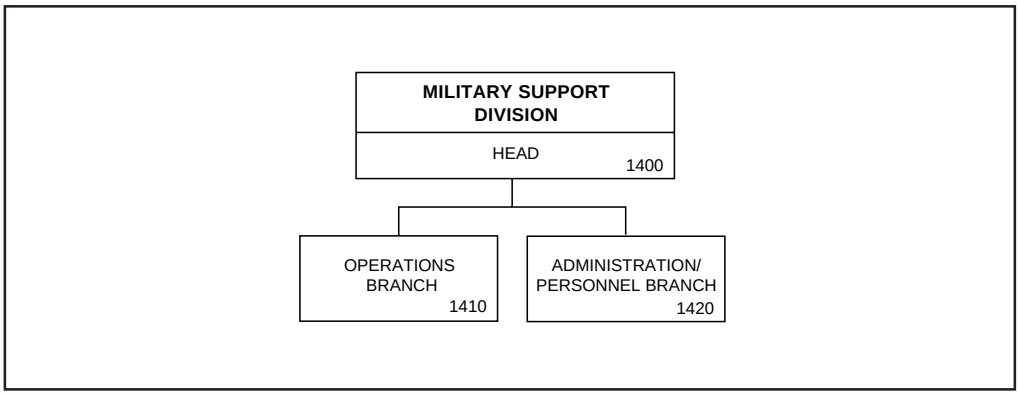
Code 1400
Staff Activity Areas

- Operations
- Administrative Operations

P-3 airborne research facility

Administration

CDR A.M. LEIGH, USN



Basic Responsibilities

The Military Support Division provides military operational, and administrative services to NRL.

The Operations Branch assists NRL Research Directorates in planning and executing project flight missions; develops deployment schedules and military operational and training objectives; and coordinates the Research Reserve Program within NRL.

The Military Administration Branch is responsible for the coordination and efficient functioning of all military administrative operations for NRL (including site detachments). These duties specifically include: personnel actions, maintenance of personnel records, performance evaluations, awards and training; advising the Chief Staff Officer on manpower matters and organization issues; and preparation and administration of the military operational budget.

Personnel: 1 full-time civilian; 10 military

Key Personnel

Name	Title	Code
CDR A.M. Leigh, USN	Head	1400
LT D.J. Popplewell, USN	Assistant Military Operations Officer	1410
CDR R.L. Miller, USN	Military Administration and Personnel	1420

Point of contact: YNC C. Coverson, USN, Code 1420, (202) 767-6058

Flight Support Detachment

Code 1600
Staff Activity Areas

- Operations
- Administrative Operations
- Aircraft Maintenance
- Safety/NATOPS

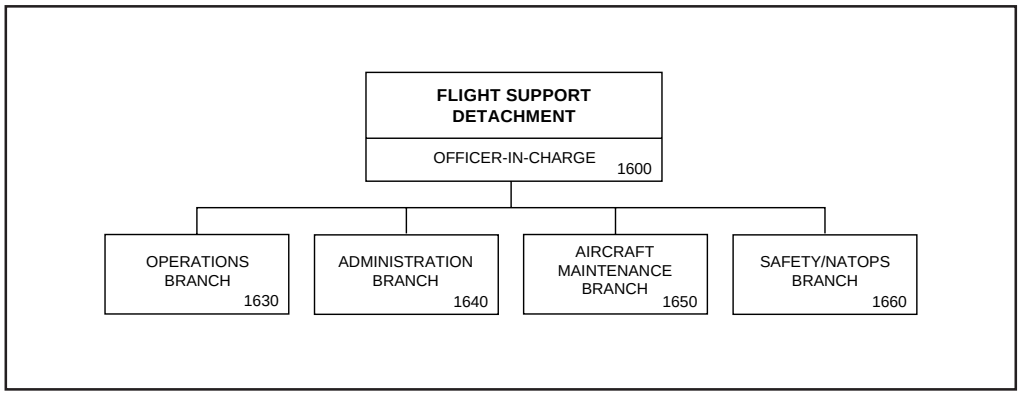
P-3 airborne research facility

Flight Support Detachment hangar

Administration

Aircraft maintenance

CDR T.A. McMurry, USN



Basic Responsibilities

The Flight Support Detachment located at NAS Patuxent River, Maryland, operates and maintains five uniquely configured P-3 Orion aircraft. The men and women of the detachment provide the Naval Research Laboratory with airborne research platforms, conducting flights worldwide in support of a wide spectrum of projects and experiments. These include: magnetic variation mapping, hydroacoustic research, bathymetry, electronic countermeasures, gravity mapping, and radar research. The detachment annually logs 2,000 flight hours and in its 34 years the Flight Support Detachment has amassed 55,000 hours of accident-free flying.

Personnel: 5 full-time civilian; 95 military

Key Personnel

Name	Title	Code
CDR T.A. McMurry, USN	Officer-in-Charge	1600
LCDR V.R. Estornell, USN	Assistant Officer in Charge	1600.1
AFCM T.E. O'Connor, USN	Command Master Chief	1600.2
Mrs. B.J. Walter	Executive Secretary	1600.4
LT E.H. Parry, USN	Operations Officer	1630
LT J.L. Virant, USNR	Administrative Officer	1640
LCDR D.L. Erlewine, USN	Aircraft Maintenance Officer	1650
ADC W.D. Nance, USN	Maintenance / Material Control Officer	1650.1
LT J.M. Baillio, USN	Head, Safety / NATOPS Branch	1660

Point of contact: Mrs. B.J. Walter, Code 1640, (301) 342-4926; DSN 342-4926

Human Resources Office

Code 1800
Staff Activity Areas

- Staffing and Classification
- Employee Development
- Employee Relations
- Equal Employment Opportunity
- Management and Systems Technology

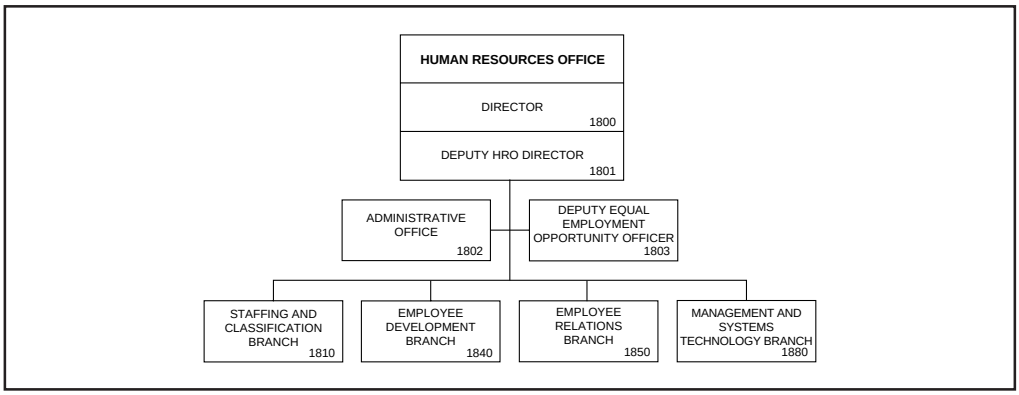
Employee Relations Branch

Information Technology Section

EEO Staff

Workforce Support and Manpower Programs

Staffing and Classification Branch



Basic Responsibilities

The Human Resources Office (HRO) provides civilian personnel and Equal Employment Opportunity (EEO) services to the Naval Research Laboratory (NRL). The Human Resources Program provides the full range of operating civilian personnel management in the staffing and placement, position classification, employee relations, labor relations, employee development, EEO functional areas, Manpower Management, and Morale, Welfare, and Recreation Programs.

The HRO at NRL-Main Site in Washington, DC services approximately 3,000 employees as well as provides a centralized capability to perform various managerial, service, and advisory functions in support of field office operations. These include such items as issuance of policy and procedural directives; development, design, and maintenance of automated systems; and monitoring and evaluating product effectiveness to develop and maintain efficient, cost-effective, service-oriented methods.

Personnel: 42 full-time civilian

Key Personnel

Name	Title	Code
Ms. B.A. Duffield*	Director	1800
Mr. D. Schenk	Deputy Director	1801
Ms. P.L. Hetzler	Administrative Officer	1802
Ms. D.E. Erwin	Deputy Equal Employment Opportunity Officer	1803
Ms. C. Downing	Head, Staffing and Classification Branch	1810
Mr. F.W. Robbins	Head, Employee Development Branch	1840
Ms. J.L. Walker	Head, Employee Relations Branch	1850
Ms. J.M. Sykes	Head, Management and Systems Technology Branch	1880

Point of contact: Ms. P. Hetzler, Code 1802, (202) 767-3035

*Acting

Business Operations Directorate

BUSINESS OPERATIONS DIRECTORATE

Code 3000

The Business Operations Directorate provides executive management, policy development, and program administration for business programs needed to support the activities of the scientific directorates. This support is in the areas of legal counsel, manpower management, financial management, supply management, contracting, public works, and management information systems support.

Associate Director of Research for Business Operations

Mr. D.K. Therning*was born in Modesto, California, on August 29, 1960. He graduated from Washington State University with a bachelor's degree in finance in 1983 and earned a master's degree in business administration from George Mason University in 1993.

Mr. Therning has accumulated extensive experience in the financial business management of research, development, test, and evaluation (RDT&E) activities within the Department of Navy (DoN) beginning at the Naval Weapons Center, China Lake, California, where he served as a budget analyst in the Public Works Department and then in the Weapons Department. In 1984, he became the Financial Management Advisor to the Ordnance Systems Department. In 1985, under the auspices of the Naval Scientist Training and Exchange Program, he was selected for a one-year assignment in the Office of the Director of Naval Laboratories (DNL), Washington, D.C. He remained on the DNL staff as a budget analyst until 1987, when he was appointed Budget Officer of the DNL's seven Navy Industrial Fund R&D laboratories.

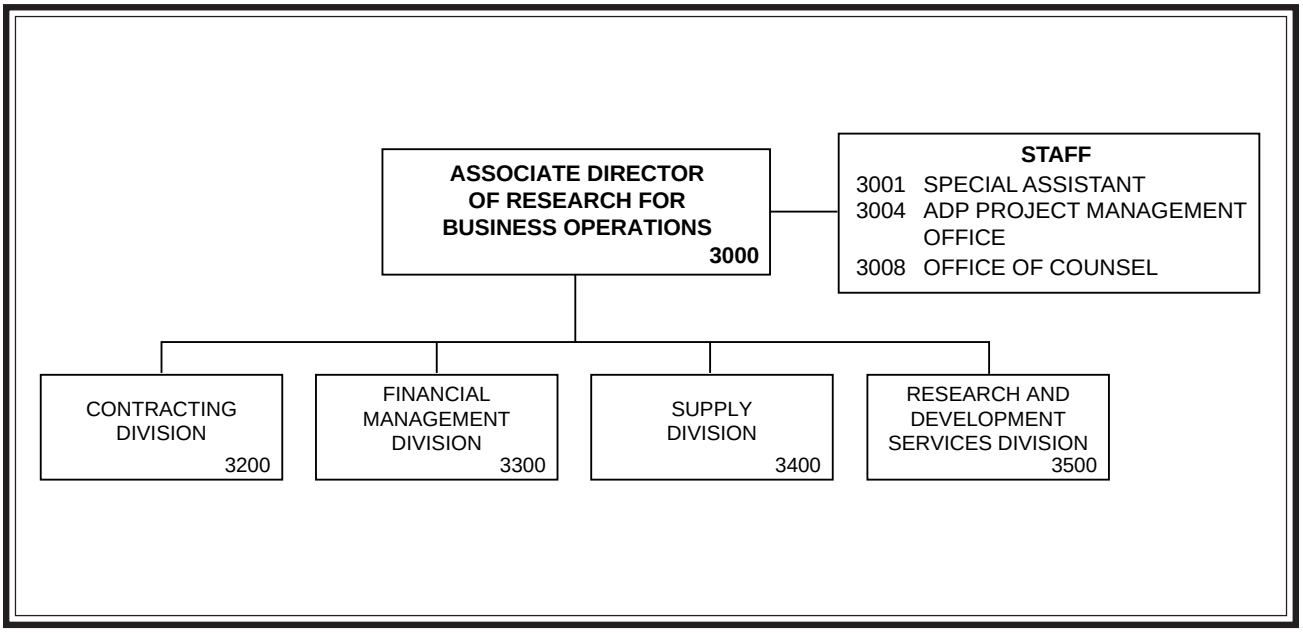
As the DoN reorganized the R&D laboratories and T&E activities, Mr. Therning oversaw the financial reorganization of the DNL labs with other activities into the Naval warfare centers. Upon the disestablishment of DNL, Mr. Therning remained in the Space and Naval Warfare Systems Command as the Director of the Defense Business Operations Fund (DZBOF) Resources Management Division, with collateral duty as the Financail Manager of the Naval Command, Control, and Ocean Surveillance Center (NCCOSC). During this time, he managed the conversion of nine appropriated fund engineering activities to DBOF and the financial consolidation of these activities with NCCOSC.

In 1995, Mr. Therning served as Head of the Revolving Funds Branch of the Office of the Assistant Secretary of the Navy (Financial Management and Controller), where he was responsible for the budget formulation and execution processes of all DoN DBOF activities, which includes the RDT&E activities, shipyards, aviation depots, ordnance centers, and supply centers.

Mr. Therning was appointed Head, Financial Management Divison / Comptroller of NRL in July 1996. Since that time, his responsibilities have increased in the Business Operations Directorate. In October 1996, in addition to leading the Financial Management Division, he assumed responsibilities for the Management Information Systems office. In January 1999, as an additional duty to his role as Comptroller, Mr. Therning was appointed to the newly established position of Deputy Associate Director of Research for Business Operations to assist in the management and administration of the Business Operations Directorate.

Mr. Therning has been the Acting Associate Director of Research for Business Operations since April 1999.

*Acting



Key Personnel

Name	Title	Code
Mr. D.K. Therning*	Associate Director of Research for Business Operations	3000
Mr. D.K. Therning	Deputy Associate Director of Research for Business Operations	3000.1
Ms. G.L. Spisak	Special Assistant	3001
Ms. D.K. Martin	Head, ADP Project Management Office	3004
Mr. J. McCutcheon	Head, Office of Counsel	3008
Mr. J. Ely	Head, Contracting Division	3200
Mr. D.K. Therning	Comptroller	3300
Ms. C. Hartman	Head, Supply Division	3400
Mr. S.D. Harrison	Director, Research and Development Services Division	3500

Point of contact: Ms. G.L. Spisak, Code 3001, (202) 404-7462

*Acting

Office of Counsel

Code 3008

MR. J. MCCUTCHEON

Basic Responsibilities

The Office of Counsel is responsible for providing legal services to NRL's management in all areas of general, administrative, intellectual property, and technology transfer law. The Office reviews all procurement-related actions; reviews NRL scientific papers prior to publication; prepares patent applications and prosecutes the applications through the Patent and Trademark Office; defends against contract protests, other contract litigation and personnel cases; and advises on other legal matters relating to technology transfer, personnel, fiscal, and environmental law.

NRL Counsel also serves as legal advisor to the Commanding Officer and Director of Research.

Personnel: 25 full-time civilian

Key Personnel

Name	Title	Code
Mr. J. McCutcheon	Head, Office of Counsel	3008
Mr. C. Steenbuck	Associate Counsel / General Law	3008.1
Mr. T. McDonnell	Associate Counsel / Intellectual Property	3008.2
Mr. A. Beede	Associate Counsel / SSC Legal Matters	3008.3

Point of contact: Ms. K. Head, Code 3008A, (202) 767-7606

Contracting Division

Code 3200

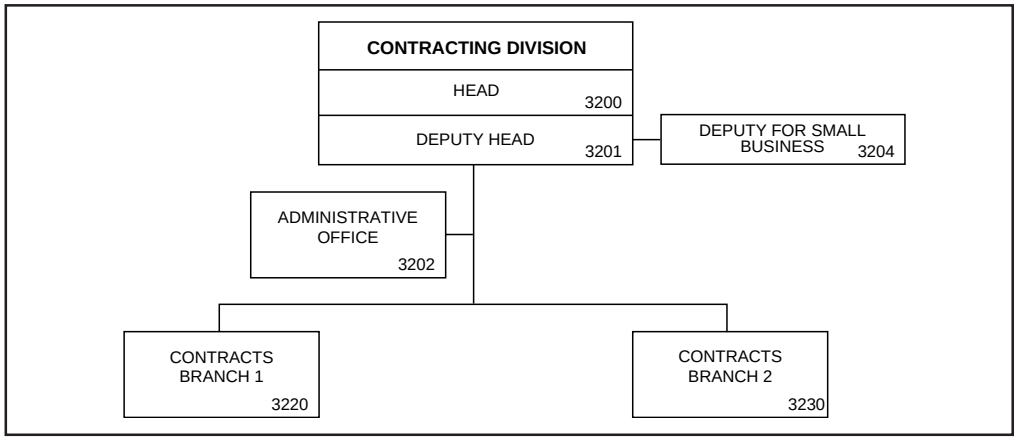
- Advance Acquisition Planning
- Acquisition Strategies
- Acquisition Training
- Contract Negotiations
- Contractual Execution
- Contract Administration
- Acquisition Policy Interpretation and Implementation
- Small Business

Contract specialist prepares contract award

Procurement Information Processing System (PIPS) coordinator consults with procurement technician and PIPS hotline representative

Deputy Division Head conducts staff meeting

MR. J. ELY



Basic Responsibilities

The Contracting Division is responsible for the acquisition of major research and development, materials, services, and facilities where the value is in excess of $100,000. It also maintains liaison with the ONR Procurement Directorate on procurement matters involving NRL. Specific functions include: providing consultant and advisory services to NRL division personnel on acquisition strategy, contractual adequacy of specifications, and potential sources; reviewing procurement requests for accuracy and completeness; initiating and processing solicitations for procurement; awarding contracts; performing contract administration and post-award monitoring of contract terms and conditions, delivery, contract changes, patents, etc., and taking corrective actions as required; providing acquisition-related training to division personnel; and interpreting and implementing acquisition-related Federal Department of Defense and Navy regulations.

Personnel: 40 full-time civilian

Key Personnel

Name	Title	Code
Mr. J. Ely	Head	3200
Ms. M.A. Carpenter	Deputy Head	3201
Ms. J. Halperson	Administrative Officer	3202
Ms. L.M. Byrne	Deputy for Small Business	3204
Ms. W. Cosby	Head, Contracts Branch 1	3220
Mr. J. Adams	Head, Contracts Branch 2	3230
Mr. J. Adams	Head, Contracts Section, SSC	3235

Point of contact: Ms. J. Halperson, Code 3202, (202) 767-3749

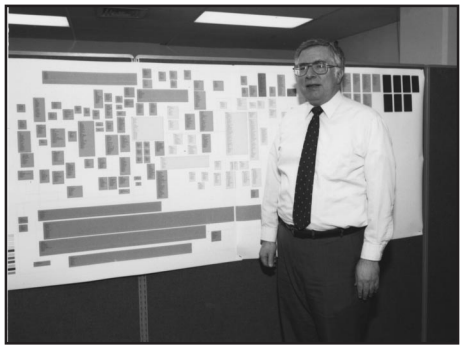
Financial Management Division

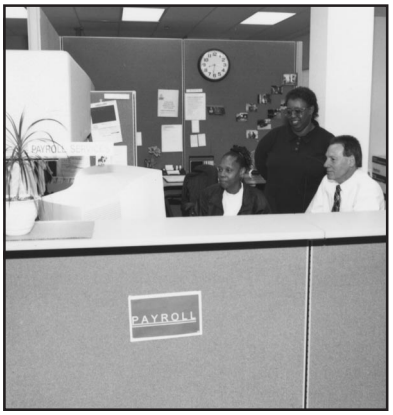
Code 3300

- Budget
- Reports and Statistics
- Accounting
- Travel Services
- Payroll Liaison
- Management Information Systems

The Budget Branch prepares various financial analyses, reports, and studies in response to external data calls and / or management requests

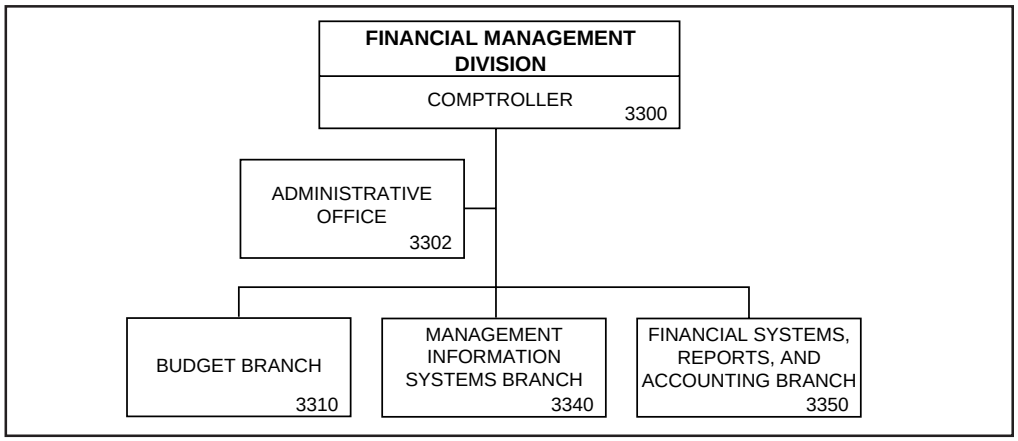
The MIS Branch operates, designs, implements, and controls the administrative and business information system for NRL





The Financial Services Section coordinates efforts with DFAS to complete payment transactions related to NRL business, such as personnel for payroll and travel expenses

MR. D.K. THERNING



Basic Responsibilities

The Financial Management Division (FMD), headed by the NRL Comptroller, develops, coordinates, and maintains an integrated system of financial management that provides the Commanding Officer, the Director of Research, and other officials of NRL the information and support needed to fulfill the financial and resource management aspects of their responsibilities. FMD translates the NRL program requirements into the financial plan, formulates the NRL budget, monitors and evaluates performance with the budget plan, and provides recommendations and advice to NRL management for corrective actions or strategic program adjustments. FMD maintains the accounting records of NRL's financial and related resources transactions and prepares reports, financial statements, and other documents in support of NRL management needs and/or to comply with external reporting requirements. FMD provides financial management guidance, policies, advice, and documented procedures to ensure that NRL operates in compliance with Navy and DoD regulations and with economy and efficiency. FMD coordinates efforts with the Defense Finance and Accounting Service (DFAS) to complete payment transactions related to NRL business (e.g., the payment of NRL personnel for payroll and travel expenses and the payment to NRL's contractors and vendors for goods and services purchased by NRL). Additionally, FMD develops, operates, and maintains automated business and management information systems supporting the lab-wide administrative and business processes, including financial management, procurement and contracting, stores and inventory, asset management, human resources, facilities, and security.

Personnel: 101 full-time civilian

Key Personnel

Name	Title	Code
Mr. D.K. Therning	Comptroller	3300
Ms. A.J. Downs	Administrative Officer	3302
Ms. D.L. Rippey	Head, Budget Branch	3310
Mr. D.K. Therning*	Head, Management Information Systems Branch	3340
Mr. J.V. Thomas	Head, Financial Systems, Reports, and Accounting Branch	3350
Mr. M. Mann	Head, Cost Accounting Section	3351
Mr. D. Tyndall	Head, Financial Services Section	3352
Ms. A. Cutchember	Head, Payroll Services Unit	3352.1
Ms. T. Frye	Head, Travel Services Unit	3352.2
Ms. D. Edwards	Head, Asset Management Unit	3352.3

Point of contact: Ms. A.J. Downs, Code 3302, (202) 767-2950

*Acting

Supply Division

Code 3400

- Disposal and Storage
- Store Material Issues
- Customer Liaison
- Automated Inventory Management System
- Purchasing
- Receipt Control
- Material Control
- Technical

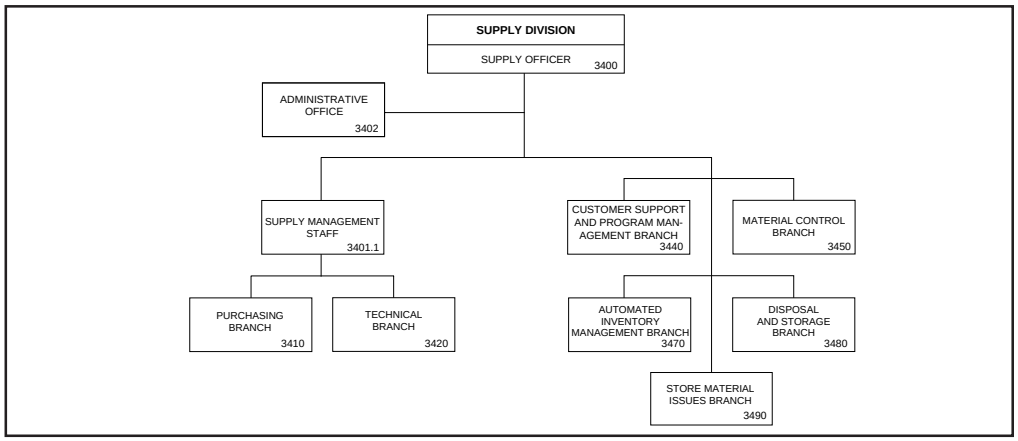
Inspection and delivery preparation for incoming material

Central Receiving in building 49 warehouse

Customers and employees at the Supply store

Bulk storage area at the Supply store

MS. C. HARTMAN



Basic Responsibilities

The Supply Division provides the Laboratory and its field activities with contracting, supply management, and logistics services. Specific functions include: procuring required equipment, material, and services; receiving, inspecting, storing, and delivering material and equipment; packing, shipping, and traffic management; surveying and disposing of excess and unusable property; operating various supply issue stores and performing stock inventories; providing technical and counseling services for the research directorates in the development of specifications for a complete procurement package; and obtaining and providing guidance in the performance stages of contractual services.

Personnel: 98 full-time civilian

Key Personnel

Name	Title	Code
Ms. C. Hartman	Supply Officer	3400
Mr. J. Booros	Head, Supply Management Staff	3401.1
Ms. A. Olson	Administrative Officer	3402
Ms. M. Smith	Head, Purchasing Branch	3410
Mr. G. Smith	Head, Technical Branch	3420
Ms. P. Carter	Head, Customer Support and Program Management Branch	3440
Mr. W. Myers	Head, Material Control Branch	3450
Ms. L. Shaw	Head, Automated Inventory Management Branch	3470
Ms. P. Carter*	Head, Disposal and Storage Branch	3480
Mr. M. Clark	Head, Store Material Issues Branch	3490

Point of contact: Ms. A. Olson, Code 3402, (202) 767-3871

*Acting

Research and Development Services Division

Code 3500

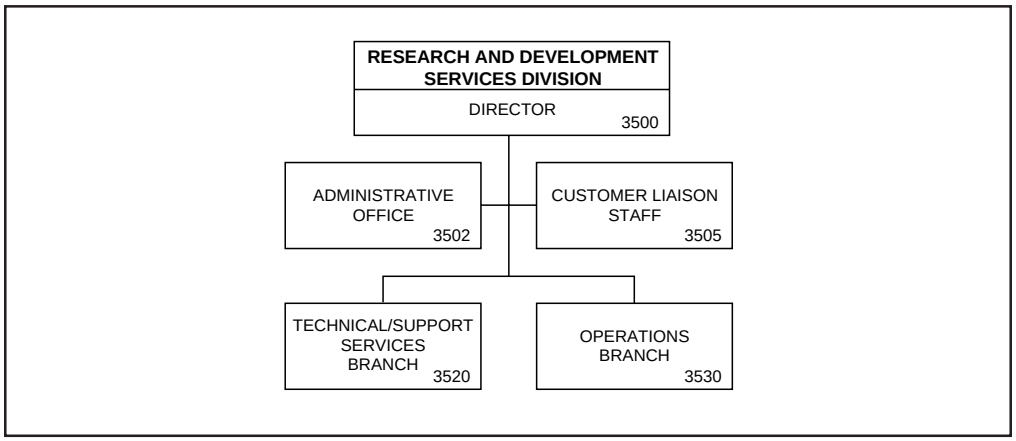
- Technical / Support Services
- Operations
- Shop Services
- Chesapeake Bay Section
- Customer Liaison

Installing fiber optic lines

Installation of Research Facility

Machine Shop Research Support

MR. S. HARRISON



Basic Responsibilities

The Research and Development Services Division is responsible for the physical plant of the Naval Research Laboratory and subordinate field sites. The responsibilities include military construction, engineering, construction, facility support services, planning, maintenance/repair/operation of all infrastructure systems, and transportation.

The Division provides engineering and technical assistance to research divisions in the installation and operation of critical equipment in support of the research mission.

Personnel: 129 full-time civilian

Key Personnel

Name	Title	Code
Mr. S. Harrison	Director	3500
Ms. L. Jones	Administrative Officer	3502
Mr. P. Le	Head, Customer Liaison Staff	3505
Mr. T. Hull	Head, Technical/Support Services Branch	3520
Mr. T. Miller	Head, Engineering Section	3521
Mr. M. Kosky	Head, Chesapeake Bay Section	3522
Mr. J. Headley	Head, Shop Services Section	3523
Mr. F. Regalia	Head, Operations Branch	3530
Mr. J. Schultz	Head, Production Control Section	3531

Point of contact: Ms. L. Jones, Code 3502, (202) 767-2168

Systems Directorate

SYSTEMS DIRECTORATE

Code 5000

The Systems Directorate applies the tools of basic research, concept exploration, and engineering development to expand operational capabilities and to provide materiel support to Fleet and Marine Corps missions. Emphasis is on technology, devices, systems, and know-how to acquire and move warfighting information and to deny these capabilities to the enemy. Current activities include:

- New and improved radar systems to detect and identify ever smaller targets in the cluttered littoral environment;
- Optical sensors and related materials to extract elusive objects in complex scenes when both processing time and communications bandwidth are limited;
- Unique optics-based sensors for detection of biochemical warfare agents and pollutants, for monitoring structures, and for alternative sensors;
- Advanced electronic support measures techniques for signal detection and identification;
- Electronic warfare systems, techniques, and devices including quick-reaction capabilities;
- Innovative concepts and designs for reduced observables;
- Techniques and devices to disable and/or confuse enemy sensors and information systems;
- Small "intelligent"/autonomous land, sea, or air vehicles to carry sensors, communications relays, or jammers; and
- High performance/high assurance computers with right-the-first-time software and known security characteristics despite commercial off-the-shelf components and connections to public communications media.

Many of these efforts extend from investigations at the frontiers of science to the support of deployed systems in the field, which themselves provide direct feedback and inspiration for applied research and product improvement and/or for quests for new knowledge to expand the available alternatives.

In addition to its wide-ranging multidisciplinary research program, the Directorate provides support to the Corporate Laboratory in shared resources for High Performance Computing and Networking, Technical Information collection and distribution and in coordination of Laboratory-wide efforts in Signature Technology, Counter-Signature Technology, Theater Missile Defense, and the Naval Science Assistance Program.

Associate Director of Research for Systems

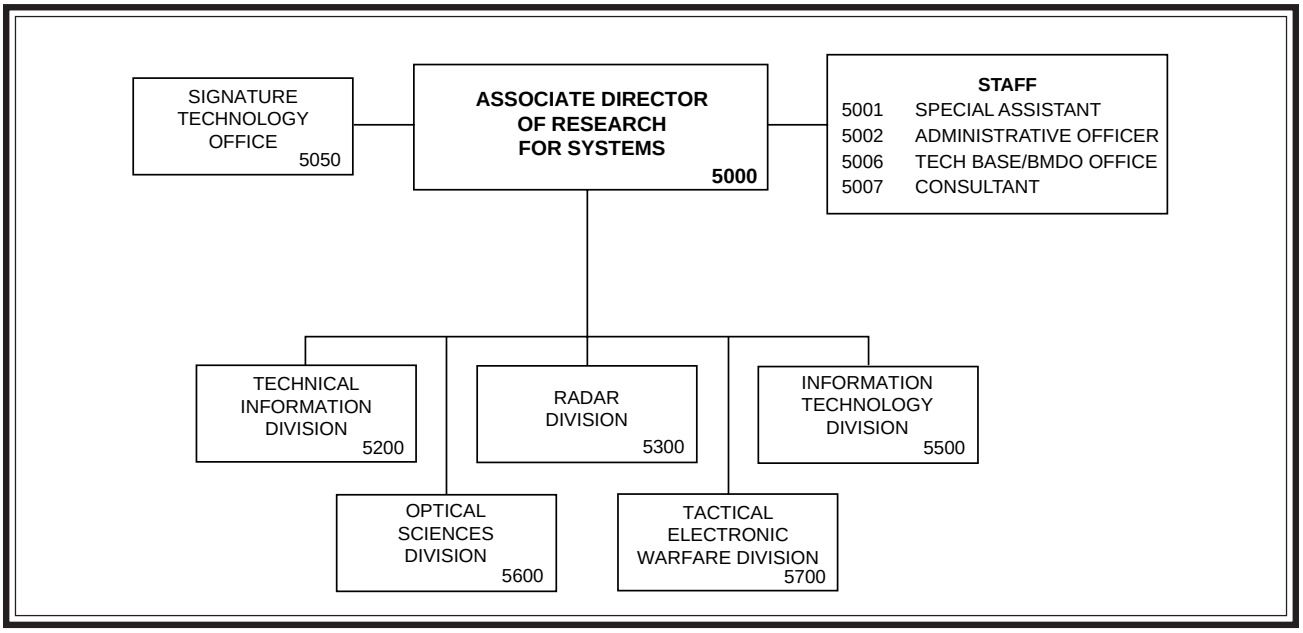
Dr. R.A. LeFande was born on Staten Island, New York on February 8, 1941. He attended the Brooklyn Technical High School and obtained his undergraduate degree in physics from the University of Rhode Island in 1962. After a brief tour as a telephone equipment engineer with Western Electric Company in New York City, he returned to academic pursuits, earning a Master's degree in physics from the Rutgers University in 1965.

In July of 1965, Dr. LeFande joined the Naval Research Laboratory as a research physicist in the Satellite Communications Branch. He worked on a variety of projects related to the design of waveforms for Naval applications, calibration of antennas and path losses by methods borrowed from radio astronomy, and on the design and acquisition of satellite communication terminals for shipboard and submarine use. By drawing on this work for a thesis topic, he obtained his Ph.D. from the University of Maryland in 1973, in the areas of astronomy and astrophysics.

In 1976, Dr. LeFande became Head of the Special Communications Branch where he nurtured and encouraged an NRL team of scientists and engineers in the development of satellite communications terminals that are now being deployed in the Fleet, and in establishing the scientific understanding and practical design principles that contributed to the selection of waveforms for MILSTAR and other systems.

From 1979 to 1981, Dr. LeFande was Technical Director and System Engineer of the Special Communication Project of the Naval Electronic Systems Command. He oversaw several research and acquisition programs related to submarine communications, which covered the spectrum from extremely low frequencies through optics and included the maintenance and operation of a worldwide network of radio transmitter facilities. After termination of the project and a brief tour as Deputy Director, Research and Technology Group, Dr. LeFande returned to NRL as Superintendent of the Aerospace Systems Division. Here he guided a diverse program of basic and applied research in Wide Area Surveillance Systems, Space Warfare, and in related areas of physical science, materials, and device technology. From 1983 to 1990, Dr. LeFande served as Associate Deputy Assistant Secretary of the Navy (C^3I and Space), providing technical and philosophical advice to eight assistant and deputy assistant secretaries. In this capacity, he took a keen interest in the issues of acquisition management reform and of the appropriate roles and missions of the Laboratory and the other Centers in the acquisition process. During this tour, Dr. LeFande was selected as a Legis Fellow and served on the staff of Representative Byron for six months in 1989, working on a variety of issues and legislation related to the Armed Services, Science and Technology, Foreign Affairs, and other matters.

Dr. LeFande returned to the Laboratory in October 1990, where he served on the staff of the Director of Research. He was designated Acting Associate Director of Research in February 1991, and Associate Director of Research in February 1992.



Key Personnel

Name	Title	Code
Dr. R.A. LeFande	Associate Director of Research for Systems	5000
Ms. B.J. Turner	Special Assistant	5001
Ms. D. Ernst	Administrative Officer	5002
Dr. S. Sacks	Head, Technology Base / Ballistic Missile Defense Organization Office	5006
Dr. M.I. Skolnik	Consultant	5007
Dr. D.W. Forester	Head, Signature Technology Office	5050
Mr. T. Calderwood	Head, Technical Information Division	5200
Dr. G.V. Trunk	Superintendent, Radar Division	5300
Dr. R.P. Shumaker	Superintendent, Information Technology Division	5500
Dr. T.G. Giallorenzi	Superintendent, Optical Sciences Division	5600
Dr. J.A. Montgomery	Superintendent, Tactical Electronic Warfare Division	5700

Point of contact: Ms. S.S. Harris, Code 5000A, (202) 767-3324

DR. S. SACKS

Technology Base/Ballistic Missile Defense Organization (BMDO) Office Code 5006

The Head of the Technology Base/BMDO Office carries out program management activities pertaining to the Navy BMD, SBIR, 6.3 A ATD, critical technology, and other technology efforts. Mission activities include assurance of technical quality and program relevance, technology philosophy, orientation of the program to priority needs and transition opportunities, and overall coordination of NRL efforts. He is the Laboratory point of contact with the Program Offices for this work.

DR. M.I. SKOLNIK

Consultant Code 5007

The radar consultant provides expert advice, historical perspectives, analyses, and investigations in the field of radar, related systems, phenomenology, and applications to the Systems Directorate, NRL, the Navy, and other DoD organizations as requested.

Signature Technology Office

Code 5050

DR. D.W. FORESTER

- Electromagnetic Scattering Fundamentals
- Low Observables Materials
- Multidisciplinary Program Management
- Technology Transfer

Basic Responsibilities

The NRL Signature Technology Office (STO) performs research and manages/coordinates an integrated, comprehensive research and development program at NRL addressing all aspects of signature control and countersignature control as they apply to Navy weapons systems. The STO monitors and evaluates signature control technology development efforts within government and industry and facilitates the incorporation of advanced signature control technologies into present and future Navy systems. It provides a central point of contact for outside agencies on matters concerning the STO program.

Personnel: 15 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.W. Forester	Research Physicist	5050

Point of contact: Ms. N.A. Carpenter, Code 5050A, (202) 767-3116

Technical Information Division

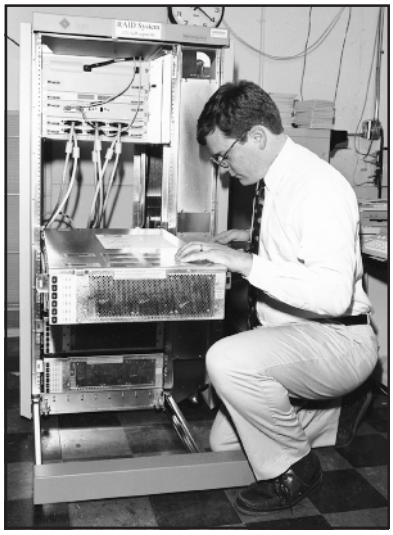
Code 5200

- NRL Historian
- Navy Acquisition Research and Development Information Center (NARDIC)
- Research Library and Technical Information Center
- Publications, Graphic Design, and Printing Services
- Photographic, Video, and Imaging Services
- Exhibits / Multimedia
- Auditorium Services
- Administrative Services

The Multimedia Center has the capability of authoring / producing multimedia programs. The Center uses two complete multimedia systems with Macromedia Director and Adobe Photoshop and a digital video editing system, the AVID Media Composer 1000.

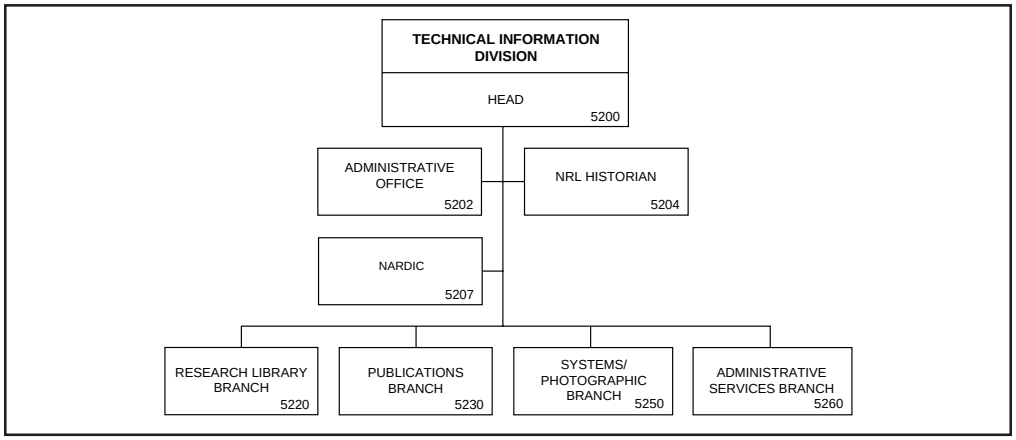
Mail clerks sort mail by directorate and file into bins by organizational codes. Mail is bundled and delivered twice a day.

The Library uses a 3.24 GB SPARC Storage RAID array to cache PDF files of the more than 160 journals it networks to NRL / ONR researchers through its Web-based TORPEDO system. In addition, TORPEDO, as the centerpiece of the Library's Digital Library Initiative, provides access to about 5,000 research reports, reprints of publications by NRL authors, and NRL press releases.



The Publications Branch staff reviews press sheets for one of NRL's publications

MR. T. CALDERWOOD



Basic Responsibilities

The Technical Information Division (TID) provides centralized support to the Laboratory, and sometimes the Office of Naval Research, by collecting, retaining, processing, publishing, presenting, and distributing information in various forms to many audiences.

TID supports the Laboratory by providing a full range of library services; by editing and publishing reports and publications; by performing specialized scientific and general photographic services, illustration and graphic design services, imaging support, scientific composition, and special projects graphics; and by providing photographic and video data-gathering and editing services.

Personnel: 95 full-time civilian

Key Personnel

Name	Title	Code
Mr. T. Calderwood	Head	5200
Ms. M.B. Gutierrez	Administrative Officer	5202
Dr. D. van Keuren	NRL Historian	5204
Ms. L. Rice	Navy Acquisition Research and Development Information Center (NARDIC)	5207
Ms. L. Stackpole	Head, Research Library Branch	5220
Ms. K. Parrish*	Head, Publications Branch	5230
Mr. J. Lucas	Head, Systems / Photographic Branch	5250
Ms. L. Warder	Head, Administrative Services Branch	5260

Point of contact: Mr. T. Calderwood, Code 5200, (202) 767-2187

*Acting

Radar Division

Code 5300
Staff Activity Areas

Systems research | Electromechanical design | Multifunction RF systems

Research Activity Areas

Radar Analysis
- Target signature prediction
- Electromagnetics and antennas
- Airborne early-warning radar (AEW)
- Inverse synthetic aperture radar (ISAR)
- Space-time adaptivity

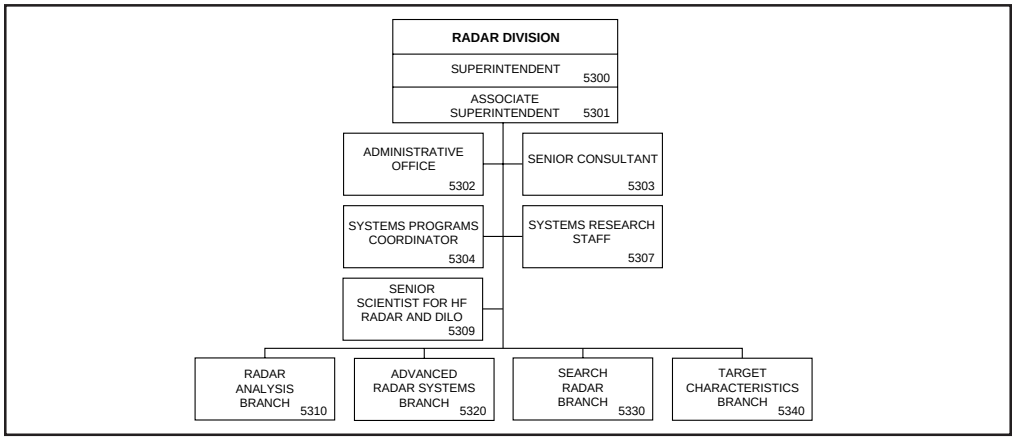
Advanced Radar Systems
- High-frequency over-the-horizon radar
- Signal analysis
- Signal processing and equipment
- Computer Aided Design (CAD)

Search Radar
- Radar systems
- Shipboard surveillance radar
- Electromagnetic Compatibility/Electromagnetic Interference (EMC/EMI)
- Mark XII IFF improvements
- Future identification technology

Target Characteristics
- Ship self defense
- Electronic counter-countermeasures
- Target signature recognition

Radar test site at Building 75, Chesapeake Bay Section (Chesapeake Beach, MD) showing radar antennas used in experimental development by the Radar Division. On the roof, from left to right: experimental 3-D elevation phase scanned antenna for SENRAD, an experimental L-Band system; a directed mirror antenna (DMAR); and antennas for the SPS-49, SPS-10, IFF, SPS-40, and the fixed array surveillance radar (FASR). On the ground from left to right are antennas for: SPQ-9B advanced development model (in radome); a high resolution X-band clutter radar; and the high range resolution monopulse (HRRM) system.

DR. G.V. TRUNK



Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analyses and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors that are applicable to enhancing the Navy's ability to fulfill its mission.

Personnel: 97 full-time civilian

Key Personnel

Name	Title	Code
Dr. G.V. Trunk	Superintendent	5300
Mr. E.E. Maine	Associate Superintendent	5301
Ms. C.A. Hill	Administrative Officer	5302
Mr. P.K. Hughes II	Senior Consultant	5303
Mr. D.F. Hemenway	Systems Programs Coordinator	5304
Mr. R.T. Ford	Head, Systems Research Staff	5307
Mr. J.M. Headrick	Senior Scientist for HF Radar and DILO	5309
Dr. W.P. Pala	Head, Radar Analysis Branch	5310
Mr. J.P. Letellier	Head, Advanced Radar Systems Branch	5320
Mr. J. Pavco	Head, Search Radar Branch	5330
Dr. B.H. Cantrell	Head, Target Characteristics Branch	5340

Point of contact: Dr. G.V. Trunk, Code 5300, (202) 767-2573

Information Technology Division

Code 5500
Research Activity Areas

Navy Center for Applied Research in Artificial Intelligence

- Case-based reasoning
- Natural language interfaces
- Intelligent tutoring
- Machine learning
- Robotics software and computer vision
- Neural networks
- Novel devices/techniques for HCI
- Voice processing (synthesis, recognition, transmission, etc.)
- Man-in-loop interface evaluation

Transmission Technology

- Arctic communication
- Submarine communication technology
- Communication system architecture
- Communication antenna/propagation technology
- Communications intercept systems
- Signal analysis systems
- Virtual engineering

Center for High Assurance Computer Systems

- Security architecture
- Formal specification/verification of system security
- COMSEC application technology
- Secure networks
- Secure databases
- Software engineering for secure systems
- Key management and distribution
- Certification and Infosec Engineering
- Formal methods for requirements specification and verification
- Tools for real-time software development

Center for Computational Science meta-computer facility

Communication Systems

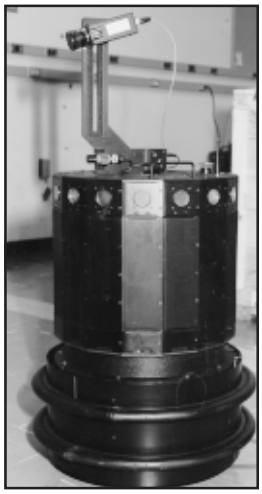
- Network design
- Reliable multicast protocols
- Tactical communication system engineering
- Distributed simulation and prototyping
- Quality of service protocols
- Integrated voice and data
- Next-generation secure voice terminal
- Integrated IP and ATM multicasting
- ATM crypto (fastlane) testing
- Tactical/warfighter's internetworking
- NILE (NATO Improved Link Eleven)

Advanced Information Technology

- Command decision support
- Parallel computing
- Joint C4ISR and operational M&S systems
- Data fusion technology
- Real-time parallel processing
- Distributed simulation
- Scalable high performance computing
- Processing graph method
- Signal processing applications
- Image processing
- Virtual reality
- Goal-oriented computational steering
- Natural environments for distributed simulation

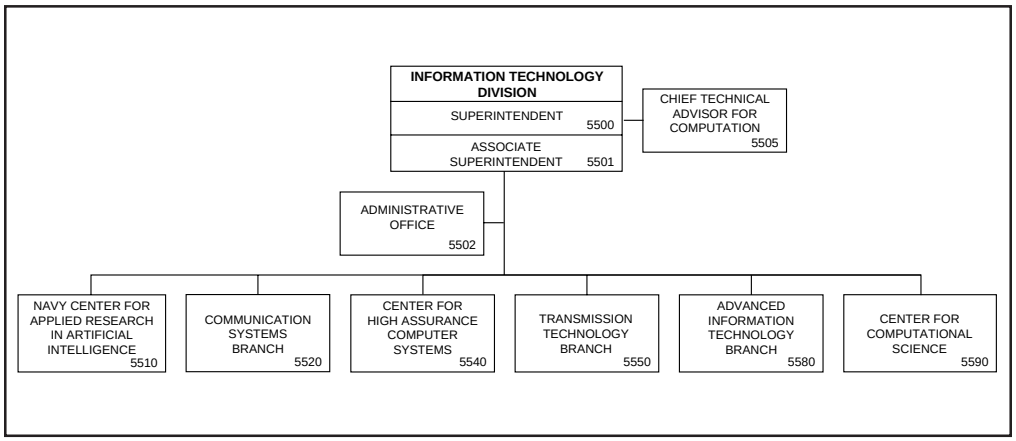
Center for Computational Science

- Network research and design
- Parallel computing
- Scalable high performance computing
- Distributed computing environments
- Scientific visualization
- Advanced ATM/SONET networking
- Video streaming technology



Mobile robots are used in experiments at the Navy Center for Applied Research in Artificial Intelligence to study sensor-based control and adaptive rehavior

DR. R.P. SHUMAKER



Basic Responsibilities

The Information Technology Division conducts research and development programs in the collection, transmission, and processing of information to provide a basis for improving the conduct of military operations. The organization of the Division is directed toward addressing the technologies and subsystems necessary to develop architectures and system designs for the next-generation battleforce warfare systems.

Personnel: 195 full-time civilian

Key Personnel

Name	Title	Code
Dr. R.P. Shumaker	Superintendent	5500
Mr. W.D. Long	Associate Superintendent	5501
Ms. J. Saunders	Administrative Officer	5502
Dr. H. Dardy	Chief Technical Advisor for Computation	5505
Dr. A.L. Meyrowitz	Director, Navy Center for Applied Research in Artificial Intelligence	5510
Mr. E.L. Althouse	Head, Communication Systems Branch	5520
Dr. J.D. McLean	Director, Center for High Assurance Computer Systems	5540
Mr. E.J. Kennedy	Head, Transmission Technology Branch	5550
Dr. S.K. Numrich	Head, Advanced Information Technology Branch	5580
Mr. J. Lockard	Director, Center for Computational Science	5590

Point of contact: Mr. W.D. Long, Code 5501, (202) 767-2954

Optical Sciences Division

Code 5600
Staff Activity Areas

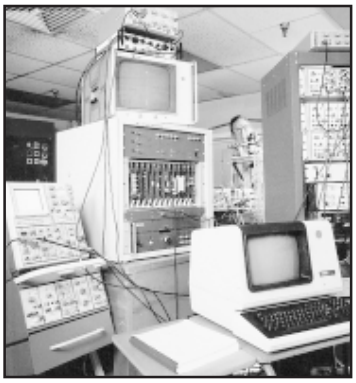
Program analysis and development
Special systems analysis
Technical study groups
Technical contract monitoring
Theoretical studies
Navy Science Assistance Program (NSAP)

Research Activity Areas

Infrared Materials and Chemical Sensors
Advanced infrared glasses and fibers
IR fiber-optic materials and devices
IR fiber chemical sensors
Fiber environmental sensors

Optical Physics
Laser materials diagnostics
Nonlinear frequency conversion
Optical instrumentation and probes
Optical seeker studies
Optical interactions in semiconductor superlattices and organic solids
Laser-induced reactions
Beam cleanup technology

Applied Optics
Detection signal processing studies
Optical and IR countermeasures
Optical technology
Ultraviolet component development and UV countermeasures
Multispectral sensors and processing
Missile warning sensor technology
UV, visible, and IR imager development
Framing reconnaissance sensors



The Focal Plane Array Evaluation Facility consists of the optical sources and electronics required to evaluate monolithic or hybrid infrared focal plane arrays that use charge-coupled device, charge-injection device, direct readout, or charge-imaging matrix technologies

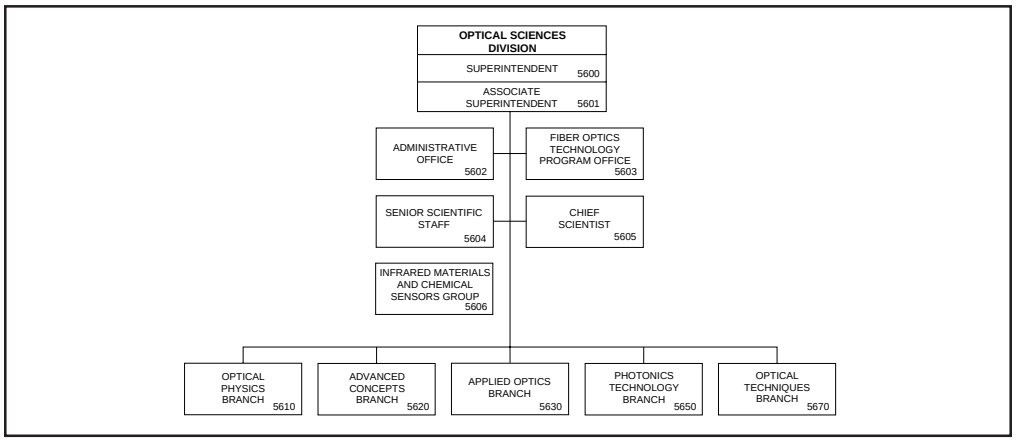
Photonics Technology
Diode laser applications
Fiber and solid-state laser/sources
High-speed (<100 fs) optical probing
High-power fiber amplifier
High-speed optical networks
Antenna remoting
RF filters and processes
Photonic control of phased arrays
Photonic analog to digital conversion

Advanced Concepts
IR Range Facility
IR low observables
Multispectral/hyperspectral/detection algorithms
EO/IR systems analysis
Airborne IR search and track technology
Atmospheric IR measurements
Ship IR signatures

Optical Techniques
Radiation effects
Fiber lasers/sources and amplifiers
Fiber-optic materials and fabrication
Fiber Bragg grating sensors/systems for smart structures
Fiber-optic sensors/systems (acoustic, magnetic, gyroscopes)
Integrated optics
Optical sources for sensors

The Missile Seeker Evaluation Facility is a computerized facility that is used to evaluate optical countermeasures to infrared missile seekers and infrared imaging sensors

DR. T.G. GIALLORENZI



Basic Responsibilities

The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near-ultraviolet and far-infrared wavelengths. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices, materials, and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities include systems analysis, prototype system development, and exploitation of R&D results for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences. The work in the Division includes studies in quantum optics, laser physics, optical waveguide technologies, laser-matter interactions, atmospheric propagation, optical technology, holography, optical warfare, optical data processing, fiber-optic sensor systems, optical systems, optical materials, radiation damage studies, IR surveillance and missile seeker technologies, IR signature measurements, optical recording materials, and optical diagnostic techniques. A significant portion of the effort is devoted to developing, analyzing, and using special optical materials. Various field measurement programs on optical problems of specific interest are also conducted.

Personnel: 137 full-time civilian

Key Personnel

Name	Title	Code
Dr. T.G. Giallorenzi	Superintendent	5600
Dr. C. Hoffman	Associate Superintendent	5601
Ms. M. Atkinson	Administrative Officer	5602
Mr. G. Cogdell	Head, Fiber Optics Technology Program Office	5603
Dr. J. Reintjes*	Head, Senior Scientific Staff	5604
Dr. L. Esterowitz	Chief Scientist	5605
Dr. I. Aggarwal	Head, Infrared Materials and Chemical Sensors Group	5606
Dr. A.J. Campillo	Head, Optical Physics Branch	5610
Dr. J.C. Kershenstein	Head, Advanced Concepts Branch	5620
Dr. R.A. Patten	Head, Applied Optics Branch	5630
Dr. R. Esman	Head, Photonics Technology Branch	5650
Dr. A. Dandridge	Head, Optical Techniques Branch	5670

Point of contact: Ms. M. Atkinson, Code 5602, (202) 767-6986

*Acting

Tactical Electronic Warfare Division

Code 5700
Staff Activity Areas

EW strategic planning
Information Warfare Technology Program
EW lead laboratory coordinator
Navy Science Assistance Program (NSAP)
Communications CM group
Effectiveness of Naval EW Systems (ENEWS)
Facility operations unit

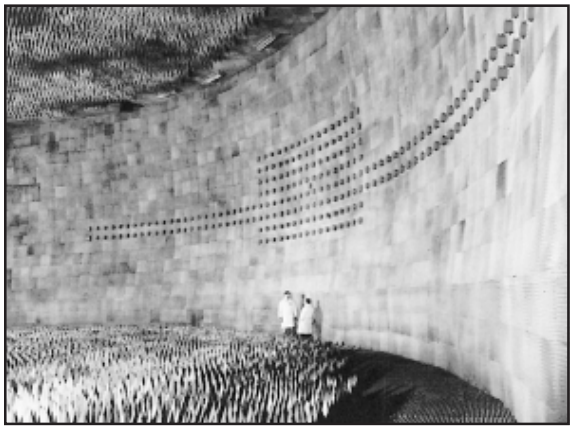
Research Activity Areas

Offboard Countermeasures
Expendable technology and devices
Unmanned air vehicles
Offboard payloads
Decoys

Airborne Electronic Warfare Systems
Air systems development
Penetration aids
Power source development
Jamming and deception
Millimeter-wave technology

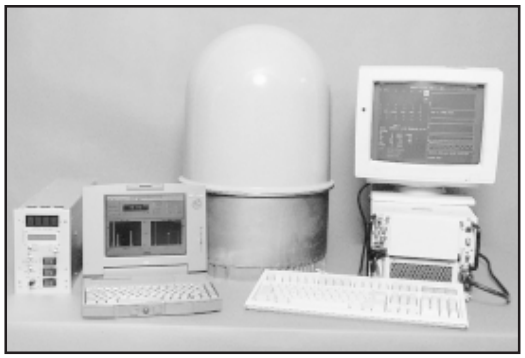
Ships Electronic Warfare Systems
Ships systems development
Jamming technology
Deception techniques
EW antennas

Electronic Warfare Support Measures
Intercept systems and direction finders
RF signal simulators
Systems integration
Command and control interfaces
Signal processing



Advanced Techniques
Analysis and modeling simulation
New EW techniques
Experimental systems
EW concepts
Infrared technology

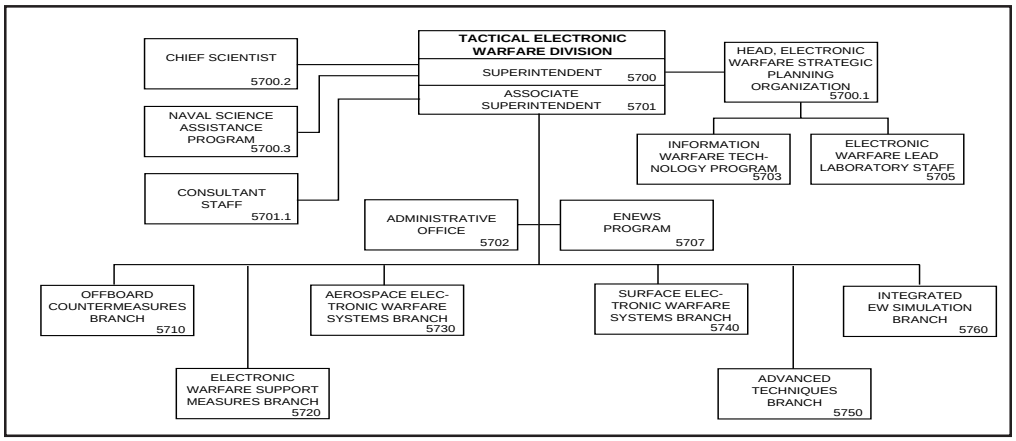
Integrated EW Simulation
Hardware-in-the-loop simulation
Data management technology
Flyable ASM seeker simulators
Foreign military equipment exploitation



Using the latest composite, MIMIC and processing technologies, the Tactical Electronic Warfare Division has developed a small, lightweight, and inexpensive ESM receiving system for use on frigates, Coast Guard vessels, and various patrol aircraft

The Central Target Simulator (CTS) Programmable Array is part of a large hardware-in-the-loop simulation facility whose purpose is to test and evaluate electronic warfare systems and techniques used to counter the radar guided missile threat to Navy forces

DR. J.A. MONTGOMERY



Basic Responsibilities

The Tactical Electronic Warfare Division (TEWD) is responsible for research and development in support of the Navy's tactical electronic warfare requirements and missions. These include electronic warfare support measures, electronic countermeasures, and supporting counter-countermeasures, as well as studies, analyses, and simulations for determining and improving the effectiveness of these systems.

Personnel: 272 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.A. Montgomery	Superintendent	5700
Dr. C.H. Heider	Head, Electronic Warfare Strategic Planning Organization	5700.1
Dr. W.E. Howell	Chief Scientist	5700.2
Ms. S. Bales	Head, Naval Science Assistance Program	5700.3
Mr. A.A. DiMattesa	Associate Superintendent	5701
Mr. A.A. DiMattesa†	Consultant Staff	5701.1
Ms. J.C. Johnson	Administrative Officer	5702
Mr. T. Jones	Head, Information Warfare Technology Program	5703
Mr. T.J. Jesswein	Head, Electronic Warfare Lead Laboratory Staff	5705
Dr. A.N. Duckworth	Manager, ENEWS Program	5707
Dr. F.J. Klemm	Head, Offboard Countermeasures Branch	5710
Mr. R.D. Oxley	Head, Electronic Warfare Support Measures Branch	5720
Dr. W.W. Everett	Head, Aerospace Electronic Warfare Systems Branch	5730
Dr. J.P. Lawrence	Head, Surface Electronic Warfare Systems Branch	5740
Dr. R.H. Evans	Head, Advanced Techniques Branch	5750
Mr. B.W. Edwards	Head, Integrated EW Simulation Branch	5760

Point of contact: Mr. A.A. DiMattesa, Code 5701, (202) 767-5974

†Additional duty

Materials Science and Component Technology Directorate

MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE

Code 6000

The Materials Science and Component Technology Directorate carries out a multidisciplinary research program whose objectives are the discovery and exploitation of new improved materials, the generation of new concepts associated with materials behavior, and the development of advanced components based on these new and improved materials and concepts. Theoretical and experimental research is carried out to determine the scientific origins of materials behavior and to develop procedures for modifying these materials to meet important naval needs for advanced platforms, electronics, sensors, and photonics. The program includes investigations of a broad spectrum of materials including insulators, semiconductors, superconductors, metals and alloys, optical materials, polymers, plastics, and artificially structured bio/molecular materials and composites, which are used in important naval devices, components, and systems. New techniques are developed for producing, processing, and fabricating these materials for crucial naval applications.

The synthesis, processing, properties, and limits of performance of these materials in natural or radiation environments, components under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established.

Additionally, major thrusts are directed in advanced space sensing, reactive flow physics, computational physics, and plasma sciences. Areas of particular emphasis include fluid mechanics and hydrodynamics, nuclear weapon effects simulations, high-energy density storage devices, interactions of various types of radiation with matter, survivability of materials and components, and directed energy devices.

Associate Director of Research for Materials Science and Component Technology

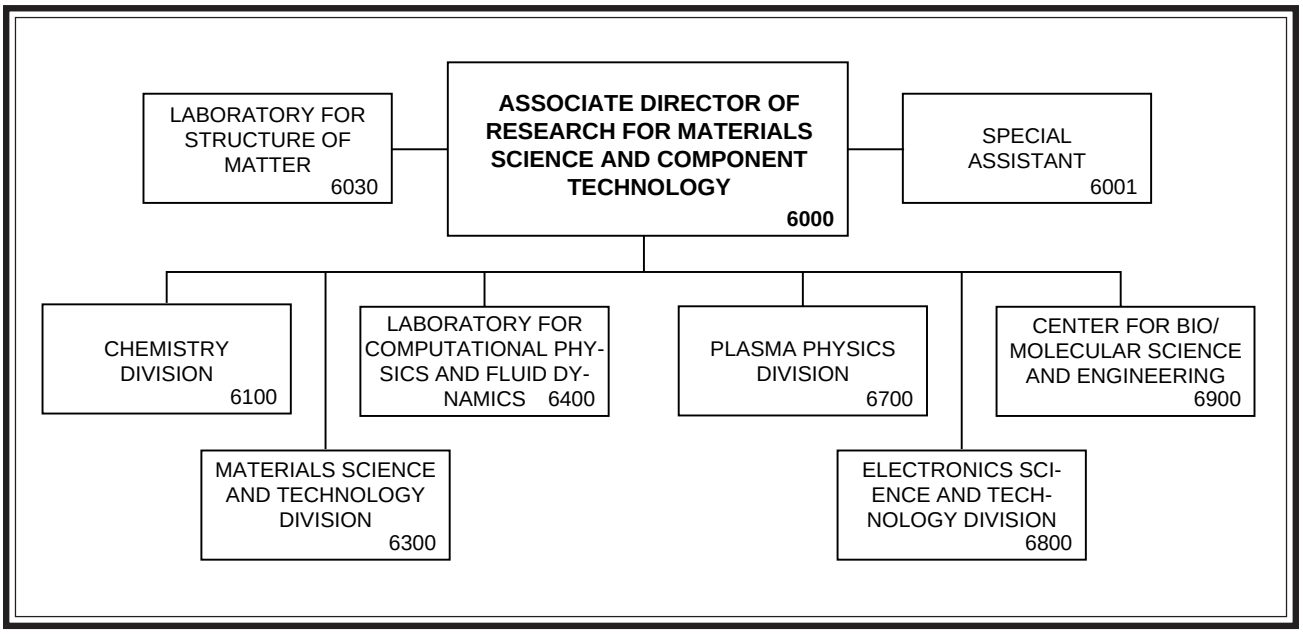
Dr. B.B. Rath was born in Banki, India, on October 28, 1934. He received a B.S. degree in physics and mathematics from Utkal University, an M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D. from the Illinois Institute of Technology.

Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961 to 1965. From 1965 to 1972, he was with the staff of the Edgar C. Bain Laboratory for fundamental research of the U.S. Steel Corporation. From 1972 to 1976, he headed the Metal Physics Research Group of the McDonnell Douglas Research Laboratories in St. Louis, Missouri, until he came to NRL as Head of the Physical Metallurgy Branch. During this period, he was adjunct Professor at the Carnegie-Mellon University, the University of Maryland, and the Colorado School of Mines. Dr. Rath served as Superintendent of the Materials Science and Technology Division from 1982 to 1986, when he was appointed to his present position.

Dr. Rath is recognized in the fields of solid-state transformations, grain boundary migrations, and structure-property relationships in metallic systems. He has published over 140 papers in these fields and edited several books and conference proceedings.

Dr. Rath serves on several planning, review, and advisory boards for both the Navy and the Department of Defense, as well as for the National Materials Advisory Board of the National Academy of Sciences, Carnegie-Mellon University, University of Virginia, Colorado School of Mines, University of Pittsburgh, University of Connecticut, University of Maryland, Carnegie-Mellon University, and Florida Atlantic University. He serves as the Navy representative and as the National leader to the Materials and Structures Subgroup of The Technical Cooperation Program (TTCP) countries and the Indo-U.S. Joint Commission on Science and Technology.

Dr. Rath is a fellow of the Minerals, Metals, and Materials Society (TMS), American Society for Materials-International (ASM), Washington Academy of Sciences, Indian Academy of Engineering, and Materials Research Society of India. He has received the 1991 George Kimball Burgess Memorial Award, TMS Leadership Award, and the Charles S. Barrett Medal for his contributions to Materials Research. He has served as chairperson of several technical committees of TMS, ASM, and AAES, and serves in the editorial boards of three international materials research journals. He is a member of the Board of Trustees of ASM-International and the Federation of Engineering Societies, and Board of Directors of The Materials Society (TMS).



Key Personnel

Name	Title	Code
Dr. B.B. Rath	Associate Director of Research for Materials Science and Component Technology	6000
Mr. R.A. Gray	Special Assistant	6001
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter	6030
Dr. J.S. Murday	Superintendent, Chemistry Division	6100
Dr. D.U. Gubser	Superintendent, Materials Science and Technology Division	6300
Dr. J.P. Boris	Chief Scientist and Director, Laboratory for Computational Physics and Fluid Dynamics	6400
Dr. S.L. Ossakow	Superintendent, Plasma Physics Division	6700
Dr. G.M. Borsuk	Superintendent, Electronics Science and Technology Division	6800
Dr. J. Schnur	Director, Center for Bio/Molecular Science and Engineering	6900

Point of contact: Mrs. J. Smithwick, Code 6000A, (202) 767-2538

Dr. Jerome Karle recipient of 1985 Nobel Prize in Chemistry

Dr. Jerome Karle's research has been concerned with diffraction theory and its application to the determination of atomic arrangements in various states of aggregation, gases, liquids, amorphous solids, fibers, and macromolecules. This research has resulted in new techniques for structure determination and a broad variety of applications. His work in crystal structure analysis was recognized by the 1985 Nobel Prize in Chemistry.

Dr. Karle is a Fellow of the American Physical Society, a member of the National Academy of Sciences, and the American Philosophical Society. He has served as president of the International Union of Crystallography, and is a member of a number of other professional societies. He has been chairman of the Chemistry Section of the National Academy of Sciences. Some time ago, he was a Professorial Lecturer in the University College of the University of Maryland and a Visiting Professor at the University of Kiel in Germany. He has also lectured at many international schools and symposia and has served on a number of international scientific organizations.

Laboratory for Structure of Matter

Code 6030

DR. J. KARLE

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of X-ray, electron, and neutron diffraction are used in a broad program of structural studies that can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines. Structural investigations relate structure to function, facilitate industrial syntheses and the creation of new materials with improved properties, and provide foundation information for numerous associated disciplines and studies. Applications are made, for example, to propellants, explosives, dense energetic materials, absorptive carbons, metallic glasses, device materials, ion carriers, antibiotics, analgesics, reversible oxygen carriers, and synthetic reaction intermediates and final products.

Personnel: 10 full-time civilian

Key Personnel

Name	Title	Code
Dr. J. Karle	Chief Scientist	6030

Point of contact: Mrs. M. Williams, Code 6030, (202) 767-3496

Chemistry Division

Code 6100
Staff Activity Areas

The Environment and Biotechnology Program Manager

Research Activity Areas

Chemical Diagnostics

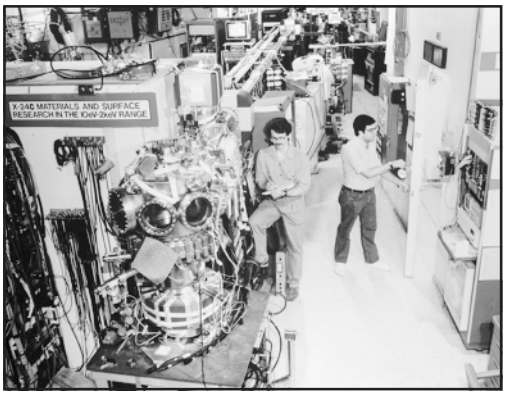
- Optical diagnostics of chemical reactions
- Kinetics of gas phase reactions
- Trace analysis
- Atmosphere analysis and control
- Ion / molecule processes
- Environmental chemistry
- Explosive stability

Materials Chemistry

- Synthesis and evaluation of innovative polymers
- Functional organic coatings
- Polymer characterization
- Quality control methodology
- Degradation and stabilization mechanisms
- High-temperature resins
- OMCVD materials
- Corrosion prevention
- Mobility fuels

Dynamics of Solids

- X-ray sources, optics, and detectors
- X-ray analysis of materials—composition and structure
- Synchrotron radiation applications
- Radiation detection and measurement
- UV optical properties of materials
- Environmental analysis



The NRL National Synchrotron Light Source research station for materials and surface research

Center for Corrosion Science and Engineering

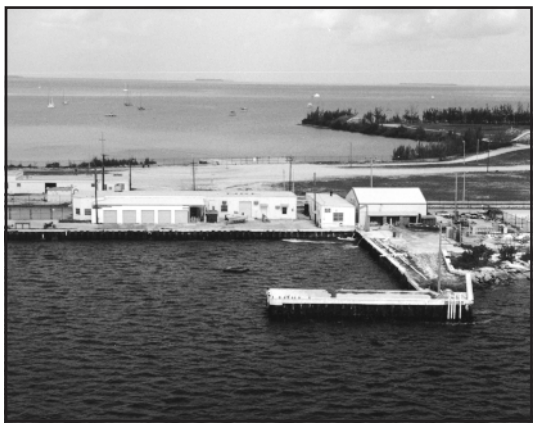
- Materials failure analysis
- Marine coatings
- Cathodic protection
- Corrosion Science
- Environmental fracture and fatigue
- Corrosion control engineering

Surface/Interface Chemistry

- Tribology
- Surface properties of materials
- Surface / interface analysis
- Chemical microdetectors
- Surface reaction dynamics
- Diamond films
- Beam-enhanced chemistry
- Electrochemistry

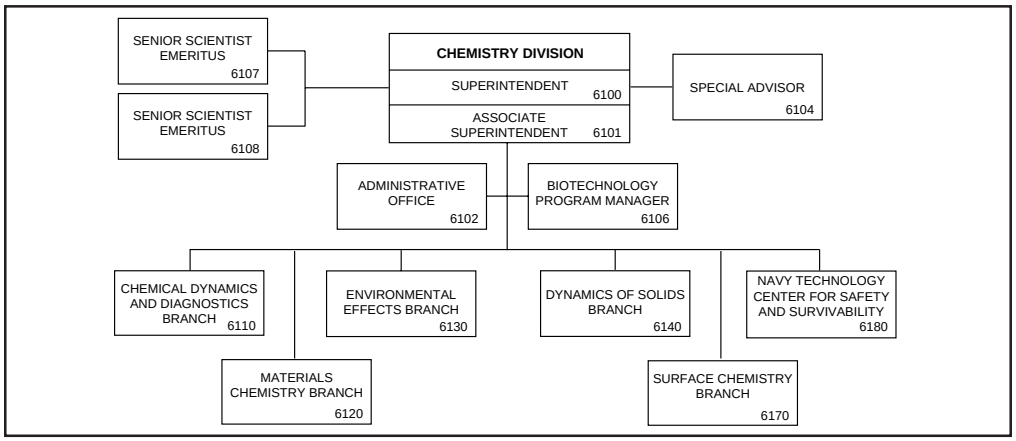
Safety and Survivability

- Combustion dynamics
- Fire protection and suppression
- Personnel protection
- Modeling and scaling of combustion systems
- Chemical and biological defense



The Key West site of the NRL Center for Corrosion Science and Engineering specializes in understanding and modeling of the marine environments impact on Naval materials. A complete laboratory for the study of corrosion control technologies providses sponsors with prototypical seawater exposure of their systems.

DR. J.S. MURDAY



Basic Responsibilities

The Chemistry Division conducts basic research, applied research, and development studies in the broad fields of chemical diagnostics, reaction rate control, materials chemistry, surface and interface chemistry, environmental chemistry, and ship safety and survivability. Specialized programs within these fields include chemical vapor precursors, coatings, functional polymers / elastomers, clusters, controlled release of energy, chemical sensors, physical and chemical characterization of surfaces, properties of nanometer structures, tribology, chemical vapor deposition /etching, atmosphere analysis and control, environmental protection / reclamation, prevention / control of fires, mobility fuels, and solution chemistry.

To enhance protection of Navy personnel and platforms from damage and injury in peace and wartime, the Navy Technology Center for Safety and Survivability performs RDT&E on fire and personnel protection, fuels, chemical defense, submarine atmospheres, and damage control aspects of ship and aircraft survivability; supports Navy and Marine Corps requirements in these areas; and acts as a focus for technology transfer in safety and survivability.

Personnel: 95 full-time civilian; 7 full-time military

Key Personnel

Name	Title	Code
Dr. J.S. Murday	Superintendent	6100
Vacant	Associate Superintendent	6101
Ms. B.L. Russell	Administrative Officer	6102
Dr. R. Holst	Special Advisor	6104
CDR A. Churilla, MSC, USN	Biotechnology Program Manager	6106
Dr. D.L. Venezky	Senior Scientist Emeritus	6107
Dr. H.W. Carhart	Senior Scientist Emeritus	6108
Dr. J. McDonald	Head, Chemical Dynamics and Diagnostics Branch	6110
Dr. L. Buckley	Head, Materials Chemistry Branch	6120
Mr. E.D. Thomas	Head, Environmental Effects Branch	6130
Mr. M.E. Bell	Head, Dynamics of Solids Branch	6140
Dr. R.J. Colton	Head, Surface Chemistry Branch	6170
Dr. F.W. Williams	Head, Navy Technology Center for Safety and Survivability	6180

Point of contact: Ms. B. Russell, Code 6102, (202) 767-2460

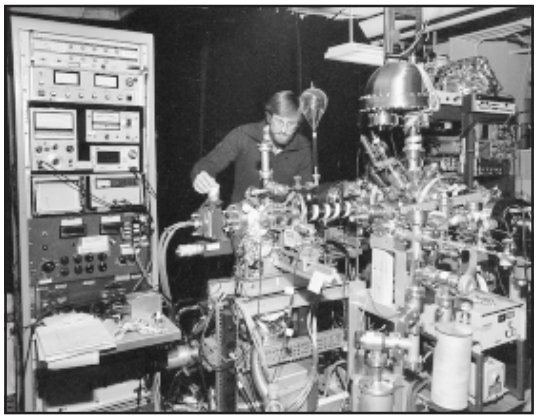
Materials Science and Technology Division

Code 6300
Research Activity Areas

Physical Metallurgy
- Ferrous and intermetallic alloys
- Synthesis/processing of metals
- Welding technology
- Micro/nano structure characterization

Complex System Theory
- Computational condensed matter physics and materials science
- Applications of electronic structure theory to solids and clusters
- Molecular dynamics
- Quantum many-body theory
- Theory of alloys
- Superconductivity theory
- Theoretical studies of phase transitions
- Atomic physics theory

Directed Energy Effects
- High-power microwave effects and countermeasures
- Laser-hardened materials and systems
- Laser point defense
- Nanostructure optics
- High-power laser interactions with materials and systems
- Atomic and molecular interactions with surfaces and interfaces
- Spectroscopy of superconductors

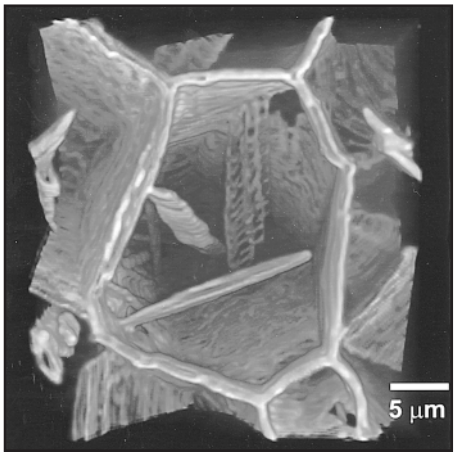


The growth of single crystal magnetic films on semiconductor substrates for electronic applications is observed

Surface Modification
- Thin film deposition
  - Pulsed laser deposition
  - Ion beam assisted deposition
  - Variable balance magnetron sputtering
- Ion engineering
  - Ion implantation
  - Reactive ion etching
- Functional materials
  - Optoelectronics
  - Electroceramics
  - Chemical sensors
- Analysis
  - Surface analysis by accelerator techniques
  - Trace element accelerator mass spectrometry
  - Mechanical loss spectroscopy

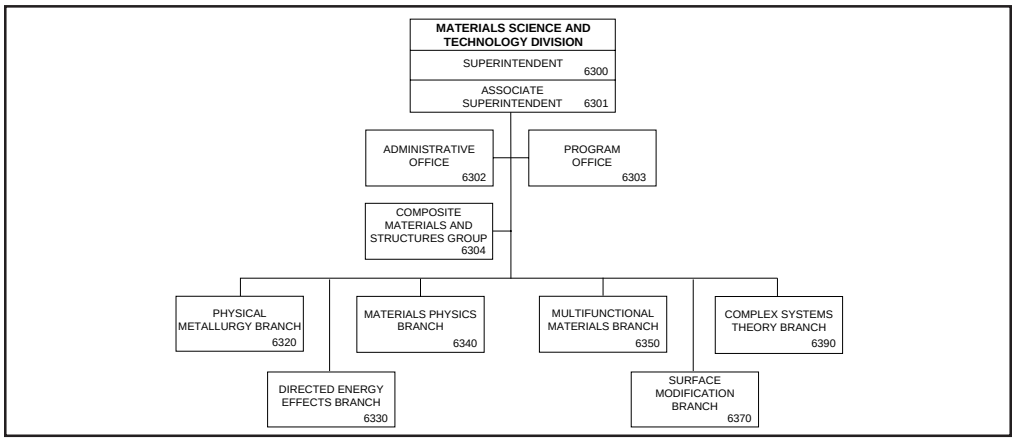
Material Physics
- Superconducting materials
- Magnetic materials
- Thermoelectric materials
- Nonlinear (chaotic) phenomena

Multifunctional Materials
- Mechanics of metallic and ceramic materials
- Nondestructive evaluation
- Smart materials/structures
- Synthesis and processing of ceramic materials



3D reconstruction of cementite precipitates in an austenite grain

DR. D.U. GUBSER



Basic Responsibilities

The Materials Science and Technology Division conducts basic and applied research and engages in exploratory and advanced development of materials having substantive value to the Navy. R&D programs encompass the intrinsic behavior of metals, alloys, ceramics, glasses, and composites and their performance and reliability in naval structures and electrical devices. Program objectives include achieving fundamental understanding of the mechanical, physical, electrical, magnetic, superconducting, and electrochemical properties of materials; identifying composition, processing, and microstructural parameters to produce improved materials; and developing guidelines for the selection, design, and certification of materials new and improved functionality and for life-cycle management. This diversity of programs is carried out by interdisciplinary teams of material scientists, metallurgists, ceramists, physicists, chemists, and engineers, using the most advanced testing facilities and diagnostic techniques.

Personnel: 110 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.U. Gubser	Superintendent	6300
Dr. D.J. Michel	Associate Superintendent	6301
Mrs. S.A. McIntire	Administrative Officer	6302
Dr. S.C. Sanday	Head, Program Office	6303
Dr. R. Badaliance	Head, Composite Materials and Structures Group	6304
Dr. E.A. Metzbower	Head, Physical Metallurgy Branch	6320
Dr. T. Wieting	Head, Directed Energy Effects Branch	6330
Dr. S.A. Wolf	Head, Materials Physics Branch	6340
Dr. K. Hathaway	Head, Multifunctional Materials Branch	6350
Dr. G. Huber	Head, Surface Modification Branch	6370
Dr. D.A. Papaconstantoupoulos	Head, Complex Systems Theory Branch	6390

Point of contact: Ms. M. Daley, Code 6300A, (202) 767-2926

Laboratory for Computational Physics and Fluid Dynamics

Code 6400
Research Activity Areas

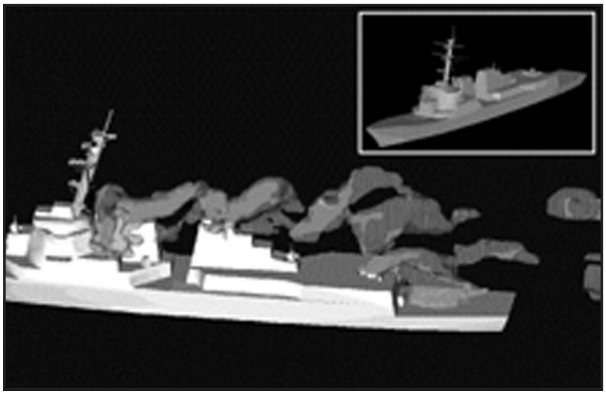
Reactive Flows

- Fluid dynamics in combustion
- Turbulence in compressible flows
- Multiphase flows
- Turbulent jets and wakes
- Turbulence modeling
- Computational hydrodynamics
- Propulsion systems analysis
- Contaminant transport modelling

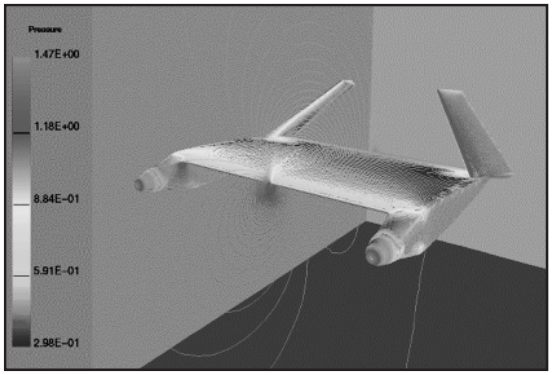
Computational Physics Developments

- Laser plasma interactions
- Inertial confinement fusion
- Solar physics modeling
- Dynamical gridding algorithms
- Advanced graphical and parallel processing systems
- Electromagnetic and acoustic scattering
- Microfluidics
- Fluid structure interaction
- Shock and blast containment

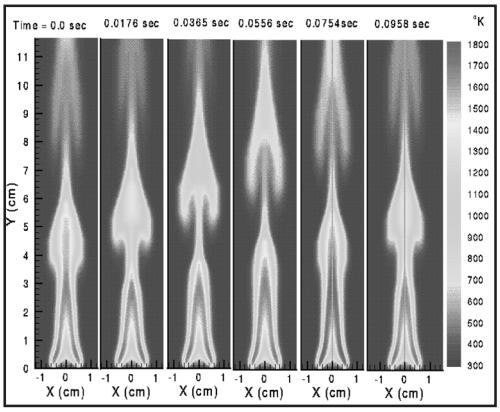
Olive (32P) and Snuffy (24P) — Origins at work



Simulation of temperature isocontours from unsteady airwake simulations over the DDG-51 destroyer were performed in a joint effort with NRL's Tactical Electronic Warfare Division (TEWD).

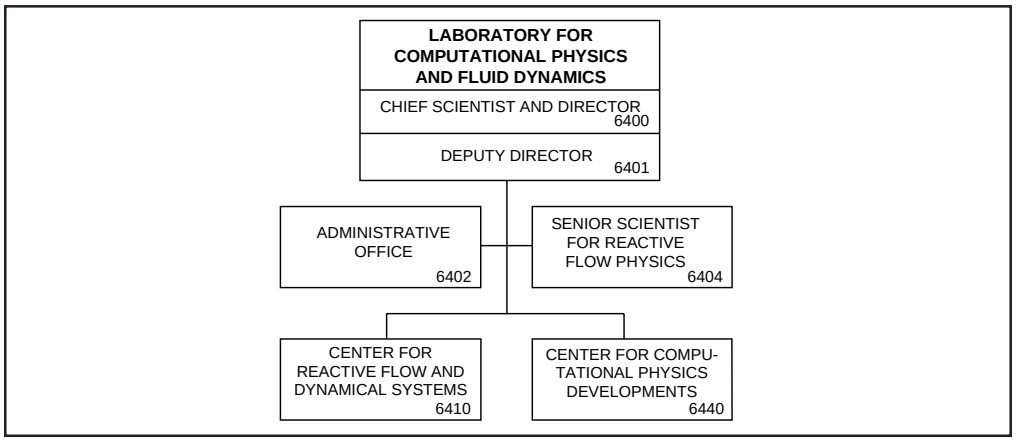


Simulation of flow past a Micro Air Vehicle. Computational Fluid Dynamics is being used to evaluate the aerodynamic performance of alternative concepts. This figure shows the pressure contours on the surface of the vehicle and a symmetry plane.



Temperature distributions from an unsteady simulation of a methanol liquid pool fire. Water mist suppression of such fires and the mechanisms involved have been elucidated using detailed reactive flow simulations.

DR. J.P. BORIS



Basic Responsibilities

The Laboratory for Computational Physics and Fluid Dynamics is responsible for the research leading to and the application of advanced analytical and numerical capabilities that are relevant to Navy, DoD, and other programs of national interest. This research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid / structure interaction including submarine and aerospace applications, atmospheric and solar geophysics, magnetoplasma dynamics for laboratory and space applications, application of parallel processing to large-scale problems such as unstructured grid generation for complex flows and target tracking and correlation for battle management, and in other disciplines of continuum and quantum computational physics as required to further the overall mission of the Naval Research Laboratory. The specific objectives of the Laboratory for Computational Physics and Fluid Dynamics are: to develop and maintain state-of-the-art analytical and computational capabilities in fluid dynamics and related fields of physics; to establish in-house expertise in parallel processing for large-scale scientific computing; to perform analyses and computational experiments on specific relevant problems using these capabilities; and to transfer this technology to new and ongoing projects through cooperative programs with the research divisions at NRL and elsewhere.

Personnel: 26 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.P. Boris	Chief Scientist and Director	6400
Dr. W.C. Sandberg	Deputy Director	6401
Mrs. C. Adams	Administrative Officer	6402
Dr. E.S. Oran	Senior Scientist for Reactive Flow Physics	6404
Dr. K. Kailasanath	Head, Center for Reactive Flow and Dynamical Systems	6410
Mr. J.H. Gardner, Jr.	Head, Center for Computational Physics Developments	6440

Point of contact: Mrs. C. Adams, Code 6402, (202) 767-6581

Plasma Physics Division

Code 6700
Research Activity Areas

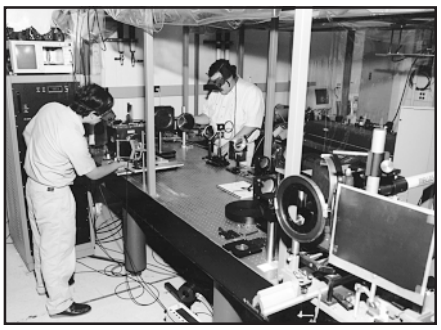
Radiation Hydrodynamics
- Pulsed-power radiation source and power-flow development
- Materials plasma processing
- Dense plasma atomic structure, processes, and equations of state
- Radiation hydrodynamics of dense Z-pinches and laser-produced plasmas
- Plasma-radiation diagnostics
- Numerical simulation of high-density plasma

Laser Plasma
- Nuclear weapons stockpile stewardship
- Laser fusion, inertial confinement
- Megabar high-pressure physics
- Rep-rate KrF laser development
- Strongly coupled plasmas

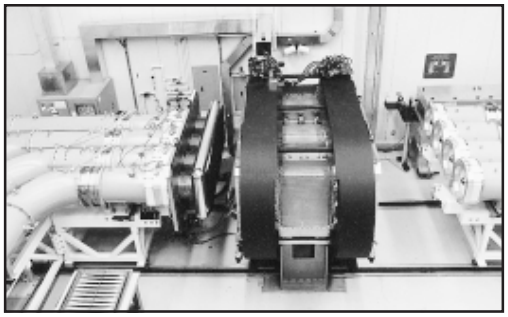
Charged Particle Physics
- Radiation source development
- Electrodeless plasma discharges for lighting
- Applications of modulated electron beams
- Rocket, satellite, and shuttle-borne natural and active experiments
- Laboratory simulation of space plasma processes
- Large area plasma processing sources
- Atmospheric and ionospheric GPS sensing
- Ionospheric radar diagnostics

Pulsed Power Physics
- Production of intense relativistic electron and ion beams
- Electron and ion beam propagation and focusing
- Ion beam inertial confinement fusion
- Materials modification by pulsed energy deposition
- Inductive and capacitative energy storage
- Plasma radiator source development

Beam Physics
- Advanced accelerators and radiation sources
- Microwave, plasma, and laser processing of materials
- Microwave sources: Magnicons, gyrotrons, and CARMS
- Ultra-high intensity laser-matter interactions
- Free electron lasers and laser synchrotrons
- Theory and simulation of space and solar plasmas
- Ionospheric modification
- Space weather modeling
- Rocket and space diagnostics
- Damage effects from laser-generated X-rays
- Novel sources for active remote sensing

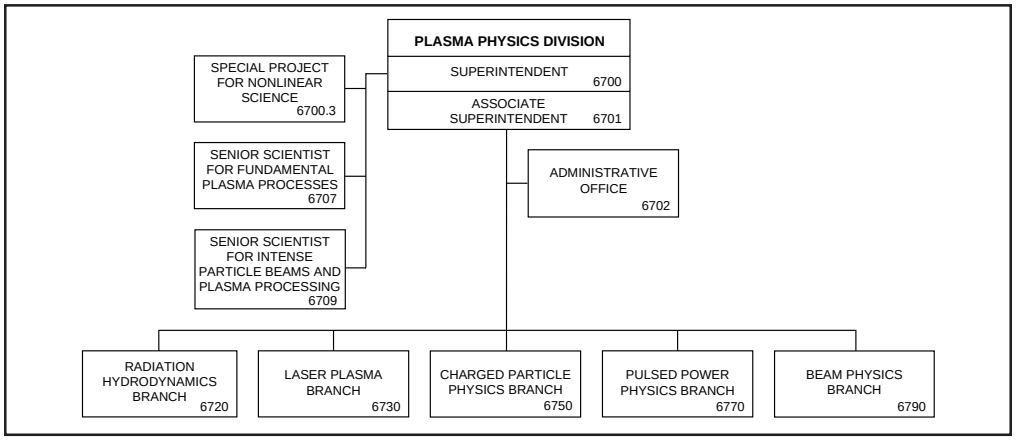


The NRL Table-Top-Terrawatt (T^3) Laser Facility. The T^3 laser currently operates at 0.4 ps, 2.5 TW and 5×10^{18} W/cm^2 and provides a facility to conduct research in intense laser-plasma interactions, intense laser-electron beam interactions, and intense laser-matter interactions.



The NIKE Krypton Fluoride (KrF) Laser is in operation to study the physics issues of Direct Drive Inertial Confinement Fusion (ICF) for defense and energy applications. Direct Drive with a KrF laser is a very attractive approach to ICF owing to its simplicity, inherent high efficiency, and very high-beam uniformity. The NIKE laser illuminates a flat target with intensities of up to 10^{14} W/cm^2 and beam nonuniformities of less than 0.25%. This photograph shows the largest amplifier in the laser. Light enters and exits the amplifier cell through the square aperture near the center of the photo. Amplification is achieved by exciting the krypton/fluorine mixture gas in the cell with two large area electron beams. One of the electron beam emitters (cathode) is in an exposed position to the left of the cell. The amplifier produces a 248 nm laser beam with total energy of 4-5 kJ.

DR. S.L. OSSAKOW



Basic Responsibilities

The Plasma Physics Division conducts a broad theoretical and experimental program of basic and applied research in plasma physics, laboratory discharge, and space plasmas, intense electron and ion beams and photon sources, atomic physics, pulsed power sources, laser physics, advanced spectral diagnostics, and nonlinear systems. The effort of the Division is concentrated on a few closely coordinated theoretical and experimental programs. Considerable emphasis is placed on large-scale numerical simulations related to plasma dynamics; ionospheric, magnetospheric, and atmospheric dynamics; nuclear weapons effects; thermonuclear plasma confinement; atomic physics; plasma processing; nonlinear dynamics and chaos; free electron lasers and other advanced radiation sources; advanced accelerator concepts; and relativistic electron beam propagation. Areas of experimental interest include: relativistic electron beams, laser-plasma, laser-electron beam, and laser-matter interactions, thermonuclear fusion, electromagnetic wave generation, the generation of intense electron and ion beams, large area plasma processing sources, high-frequency microwave processing of ceramic materials, advanced accelerator development, inductive energy storage, laboratory simulation of space plasma phenomena, and in-situ and remote sensing space plasma measurements.

Personnel: 115 full-time civilian

Key Personnel

Name	Title	Code
Dr. S.L. Ossakow	Superintendent	6700
Dr. V.L. Patel	Associate Superintendent	6701
Dr. P. Palmadesso	Head, Special Project for Nonlinear Science	6700.3
Vacant	Administrative Officer	6702
Dr. W. Manheimer	Senior Scientist, Fundamental Plasma Processes	6707
Dr. M. Lampe	Senior Scientist, Intense Particle Beams and Plasma Processing	6709
Dr. J. Davis	Head, Radiation Hydrodynamics Branch	6720
Dr. S. Bodner	Head, Laser Plasma Branch	6730
Dr. R. Meger	Head, Charged Particle Physics Branch	6750
Dr. G. Cooperstein	Head, Pulsed Power Physics Branch	6770
Dr. P. Sprangle	Head, Beam Physics Branch	6790

Point of contact: Dr. V.L. Patel, Code 6701, (202) 767-2997

Electronics Science and Technology Division

Code 6800
Research Activity Areas

Electronic Materials
- Preparation and development of magnetic, dielectric, optical, and semiconductor materials
- Electrical, optical, and magneto-optical studies of semiconductor microstructures and nanostructures, surfaces, and interfaces
- Impurity and defect studies
- Structural and electronic properties of amorphous semiconductors
- Condensed matter theory
- High magnetic field phenomena

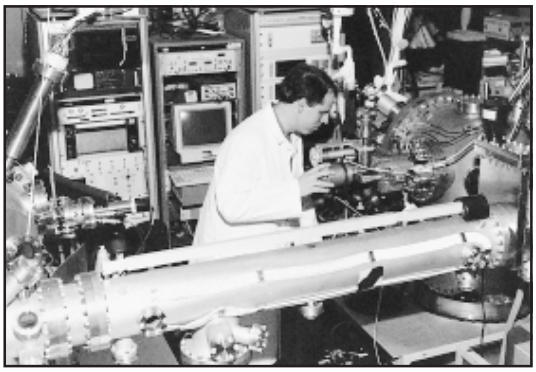
Surface and Interface Sciences
- Metal organic chemical vapor deposition
- Surface and interface physics
- Vacuum surface research
- Processing research for nanometric electronics
- Growth and characterization of micro- and nanosurfaces and interface structures
- High-temperature superconductors

Microwave Technology
- Microwave, millimeter-wave, and submillimeter-wave component and circuit research
- Microwave and millimeter-wave integrated circuits
- Surface acoustic wave devices
- High-frequency device design, simulation, and fabrication
- Ion implantation technology
- Reliability and failure physics of electronic devices and circuits

Radiation Effects
- Space experiments
- Single event effects
- Radiation tolerant ultra low power microelectronics
- Ultra-fast charge collection
- Environmental hazard remediation
- Advanced photovoltaic technologies
- Femtosecond laser research
- Radiation effects in microelectronics and photonics
- Material and device damage and hardening

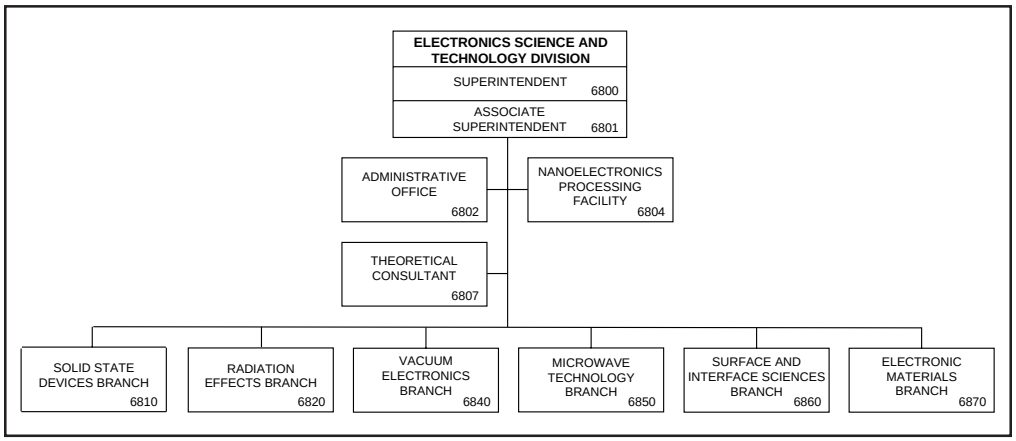
Solid State Devices
- Solid-state optical sensors
- Radiation effects / hardening of electronic devices, circuits, and optoelectronic sensors
- Microelectronics device research and fabrication
- Solid state circuits research
- Signal processing research

Vacuum Electronics
- Microwave and millimeter power amplifier research and development
- Cathode research and development
- Thermionic energy conversion
- Field emission arrays
- Vacuum electronic devices
- Tube fabrication and support technology



The EPICENTER specializes in molecular beam epitaxial growth of nanostructures created by alternating layers of narrow bandgap materials made available from four ultrahigh vacuum chambers. These structures are expected to improve the performance of far-infrared detectors, mid-wave lasers, and superhigh frequency transistors and resonant tunneling diodes. Here a scientist in the Electronics Science and Technology Division is shown creating a structure using high vacuum, chamber-to-chamber sample transfer.

DR. G.M. BORSUK



Basic Responsibilities

The Electronics Science and Technology Division conducts programs of basic science and applied research and development in materials growth and properties, surface physics, micro- and nano- structure electronics, microwave techniques, microelectronic device research and fabrication, vacuum electronics, high-power microwave generation, and cryoelectronics, including superconductors. The activities of the Division couple device research both to basic materials investigations and to systems research and development needs.

Personnel: 148 full-time civilian

Key Personnel

Name	Title	Code
Dr. G.M. Borsuk	Superintendent	6800
Dr. K. Sleger	Associate Superintendent	6801
Mrs. Z. Basinger	Administrative Officer	6802
Dr. C.R.K. Marrian	Head, Nanoelectronics Processing Facility	6804
Dr. K.L. Ngai	Theoretical Consultant	6807
Dr. J.M. Killiany	Head, Solid State Devices Branch	6810
Dr. A.B. Campbell	Head, Radiation Effects Branch	6820
Dr. R.K. Parker	Head, Vacuum Electronics Branch	6840
Dr. D. Webb	Head, Microwave Technology Branch	6850
Dr. M. Peckerar	Head, Surface and Interface Sciences Branch	6860
Dr. B.V. Shanabrook	Head, Electronic Materials Branch	6870

Point of contact: Dr. K. Sleger, Code 6801, (202) 767-3894

Center for Bio/Molecular Science and Engineering

Code 6900
Research Activity Areas

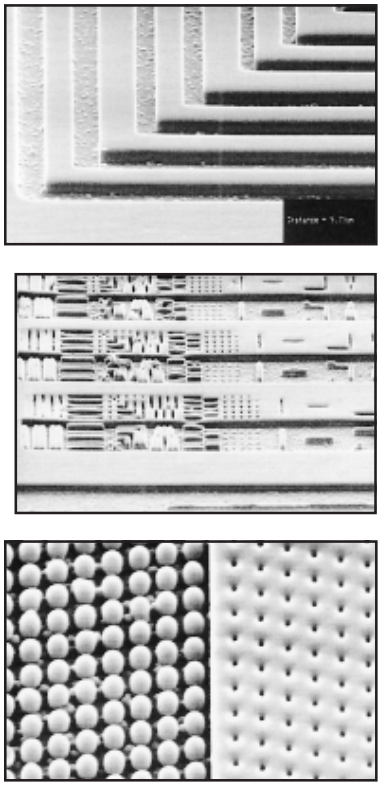
Biologically Derived Microstructures
Self-assembly, molecular machining
Synthetic membranes, molecular printing
Nanocomposites
Tailored electronic materials
Low observables

Biosensors
Binding polypeptides
Cell-based biosensor
DNA biosensor
Fiber-optic biosensor
Flow immunosensor
Array-based sensors

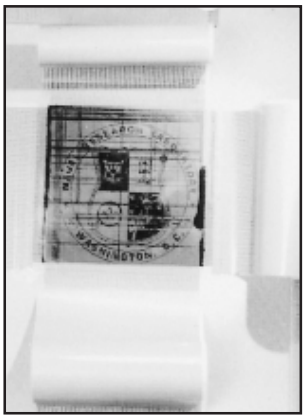
Environmental Quality
Oil / bilgewater separation
Soil / groundwater explosives detection
Antifouling paint, controlled release
Polyurethanase degradation
Antisense DNA
Heavy-metal detection
Heavy-metal cleanup

Polymers and Liquid Crystals
Ferroelectronic liquid crystals
Advanced materials / information processing
Flexible displays, noninvasive alignment technique

Surfaces and Interfaces
Uncooled IR detectors / imagers
Submicron resists and microlithography
Specifically activated thin films
Neuronal patterning



Injection molded patterned micro-textured biopolymers are being fabricated from silicon templates, using lithographic tools. These biomaterials are being explored for use in devices, which incorporate biomolecules (antibodies and DNA) and biological cells for sensor and tissue engineering applications.

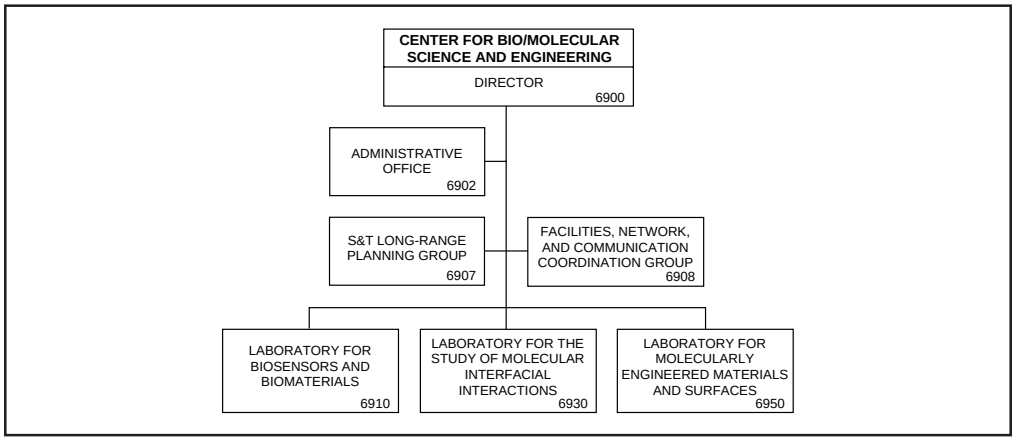


NRL logo shown on a Flexible Liquid Crystal display. The resolution of the image is 100 dpi. The display is rugged, portable, and light weight. The applications being considered include handheld map reader and curved displays for cockpits.

Portable flow immunosensor developed for on-site analysis of environmental contaminants in groundwater and soil

Electron micrograph of lipid tubules, showing one complete lipid bilayer surrounded by a helically wrapped partial bilayer. These self-assembled microstructures have applications that include controlled release, field emitting cathodes, and electronic obscurants for low observables.

DR. J.M. SCHNUR



Basic Responsibilities

The Center for Bio / Molecular Science and Engineering is using the tools of modern biology, physics, chemistry, and engineering to develop advanced materials and sensors. The long-term research goal is first to gain a fundamental understanding of the relationship between molecular architecture and the function of materials, then apply this knowledge to solve problems for the Navy and DoD community. The key theme is the study of complex bio / molecular systems with the aim of understanding how "nature" has approached the solution of difficult structural and sensing problems. Technological areas currently being studied include molecular and microstructure design, molecular biology, self-assembly, controlled release and encapsulation, and surface patterning and modification. Much of the research deals with the self-assembly of lipids, proteins, and liquid crystals into complex microstructures for use in advanced material applications, and the harnessing of the recognition functions of proteins and cells for the development of advanced sensors. A highly multidisciplinary staff is required to pursue these research and development programs. The Center provides a stimulating environment for cross-disciplinary programs in the areas of immunology, biochemistry, electrochemistry, inorganic and polymer chemistry, microbiology, microlithography, photochemistry, biophysics, spectroscopy, advanced diagnostics, organic synthesis, and electro-optical engineering.

Personnel: 38 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.M. Schnur	Director	6900
Ms. A. Kusterbeck	Assistant Director	6901
Ms. M. Shorb	Administrative Officer	6902
Mr. Dan Zebetakis	Head, Facilities, Network, and Communication Coordination Group	6908
Dr. F.S. Ligler	Head, Laboratory for Biosensors and Biomaterials	6910
Dr. B.P. Gaber	Head, Laboratory for the Study of Molecular Interfacial Interactions	6930
Dr. R. Shashidhar	Head, Laboratory for Molecularly Engineered Materials and Surfaces	6950

Point of contact: Ms. M. Shorb, Code 6902, (202) 404-6015

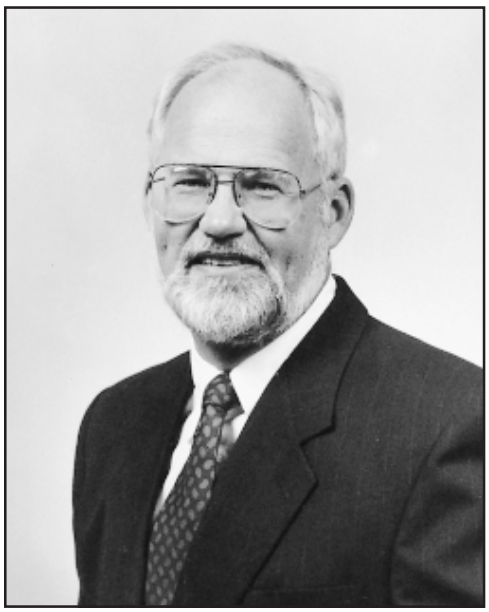
Ocean and Atmospheric Science and Technology Directorate

OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE

Code 7000

The Ocean and Atmospheric Science and Technology Directorate performs research in the fields of acoustics, remote sensing, oceanography, marine geosciences, marine meteorology, and space science. Areas of emphasis in acoustics include advanced acoustic concepts and computation, environmental acoustics, acoustic signal processing, physical acoustics, acoustic systems, ocean acoustics, and acoustic simulation and tactics. Areas of emphasis in remote sensing include radio, infrared, and optical sensors, remote sensing physics and hydrodynamics, remote sensing simulation, and imaging systems. Areas of emphasis in oceanography include coastal and open ocean dynamics and prediction, coastal and open ocean processes, and remote sensing applications to oceanography. Areas of emphasis in marine geosciences include marine physics, seafloor sciences, and mapping, charting, and geodesy. Areas of emphasis in marine meteorology include global, theater, and tactical scale prediction systems and forecast support. Areas of emphasis in space science include ultraviolet measurements, X-ray astronomy, upper atmospheric physics, gamma and cosmic rays, solar physics, and solar terrestrial relationships. Senior naval officers are assigned as military deputies to help maintain the directorate focus on operational Navy and other DoD requirements in these areas of emphasis. The directorate is responsible for administrative and technical support to major activities in Washington, DC, Stennis Space Center, Mississippi, and Monterey, California.

Associate Director of Research for Ocean and Atmospheric Science and Technology



Dr. E.O. Hartwig was born in Cincinnati, Ohio on November 22, 1946. He obtained his B.S. degree in biological sciences from the University of Texas at El Paso in 1968, and his Ph.D. from Scripps Institution of Oceanography in 1974. After completing his graduate studies, Dr. Hartwig accepted a position as a researcher at the Scottish Marine Biological Association (SMBA) in Oban, Scotland, where he established a sea-going experimental marine microbiological effort.

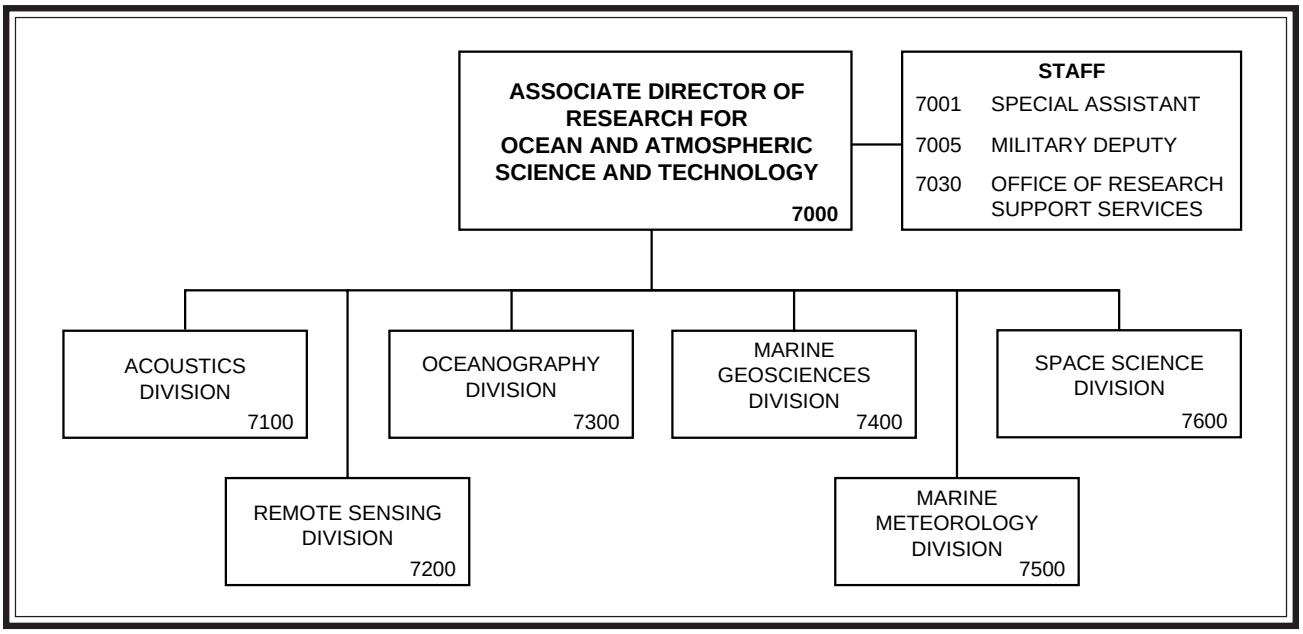
In 1975, Dr. Hartwig returned to the U.S., accepting a position at the Chesapeake Bay Institute of Johns Hopkins University. His shallow water research concentrated on the Chesapeake Bay and its outflow region, in active collaboration with many institutions and scientists. The efforts sought to understand the biological dynamics associated with the Bay's flow regimes, and studied the underlying water column and benthic biological processes resulting in the onset of the seasonal summer anoxia of the bay.

In 1978, Dr. Hartwig accepted a position at Marine Ecological Consultants (MEC), where his research centered on understanding the "before operations" environment at a nuclear generating station. In 1980, Dr. Hartwig accepted a position at the Lawrence Berkeley Laboratory (LBL) at the University of California at Berkeley to head up the biological component of a research team studying the concept of a proposed Ocean Thermal Energy Conversion (OTEC) plant. His work involved extensive interactions with engineers on the operating characteristics of the plant and physical oceanographers modeling flow regimes around the plant and to be generated by the plant.

Following his research at LBL, Dr. Hartwig joined the Office of Naval Research in 1982 as a scientific officer in the Oceanic Chemistry/Biology Program. When the program was split into an Oceanic Chemistry and Oceanic Biology Program, Dr. Hartwig became Program Manager of the Oceanic Biology Program. Here, Dr. Hartwig developed several major interdisciplinary research initiatives for the Navy.

In 1987, Dr. Hartwig was selected as Director of Ocean Sciences at ONR. He enhanced both university interactions with Ocean Sciences and the stature of ONR Ocean Science scientific officers and program managers in the Federal Government. Dr. Hartwig, working with the Oceanographer of the Navy, developed and implemented the Navy's academic research vessel rebuild program, which has resulted in fewer, more capable oceanographic vessels for the next millennium.

Dr. Hartwig joined NRL in October 1992 as Associate Director of Research for Ocean and Atmospheric Science and Technology. In 1996, Dr. Hartwig was presented the Presidential Rank Award of Meritorious Executive in the Senior Executive Service (SES).



Key Personnel

Name	Title	Code
Dr. E.O. Hartwig	Associate Director of Research for Ocean and Atmospheric Science and Techology	7000
Ms. S.K. Le	Special Assistant	7001
Vacant	Military Deputy	7005
Mr. G.R. Bower	Head, Office of Research Support Services	7030
Dr. E.R. Franchi	Superintendent, Acoustics Division	7100
LCDR S.P. Sopko, USN	Naval Science (Acoustic) Research Coordinator	7105
Dr. P. Schwartz	Superintendent, Remote Sensing Division	7200
CDR R.T. Barock, USN	Military Deputy	7205
Vacant	Superintendent, Oceanography Division	7300
CDR C.J. Hall, USN	Military Deputy	7305
Dr. H.C. Eppert, Jr.	Superintendent, Marine Geosciences Division	7400
LCDR R. McDowell, USN*	Military Deputy	7405
Dr. P.E. Merilees	Superintendent, Marine Meteorology Division	7500
LCDR C.A. Springer, USN	Military Deputy	7505
Dr. H. Gursky	Superintendent, Space Science Division	7600

Point of contact: Ms. L.M. Stanbery, Code 7000A, (202) 404-8174

*Acting

Office of Research Support Services

Code 7030
Staff Activity Areas

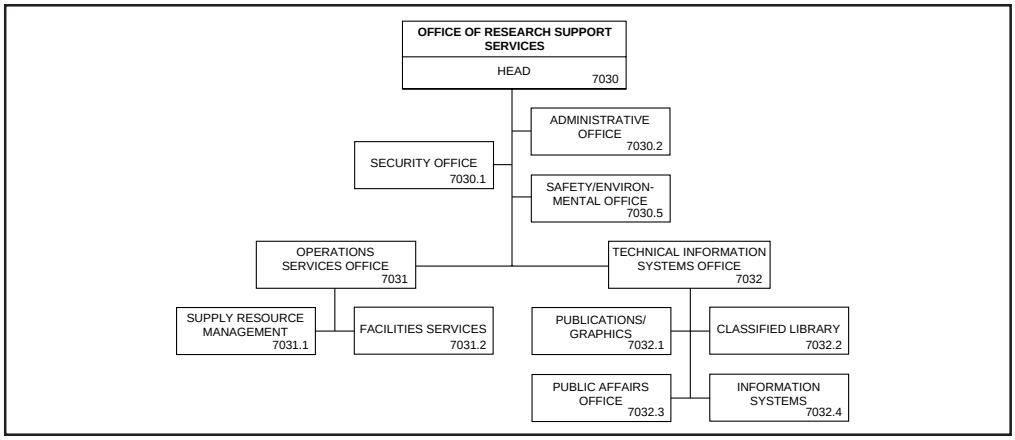
Security Office
- Information security
- Physical security
- Industrial security
- AIS security
- Personnel security
- Classification
- SCIF management
- Security investigations

Operations Services Branch
- Directives, reports, forms
- Mail management
- Navy message center
- Classified material control
- Facilities planning
- Vehicles
- Shipment via FedEx and common carriers

Safety/Environmental Office
- Industrial/laboratory safety
- Specialized safety training
- Hazard abatement
- Mishap prevention
- Hazardous materials program
- Hazardous waste disposal

Technical Information Systems Office
- Scientific and technical information management
- Technical and classified library
- Technical editing, illustration, reproduction (color and black and white), printing
- Visual information, photographic services
- Community relations
- News releases
- Exhibits
- Information
- Conference coordination, video teleconferencing
- Freedom of Information Act
- Data communications
- Data networking
- Computer network maintenance
- Consulting and planning
- Supercomputing interface management
- Advanced communications testbed

MR. G.R. BOWER



Basic Responsibilities

The Office of Research Support Services is responsible for the operational and management support necessary for the day-to-day operations at NRL Stennis Space Center, Mississippi (NRL SSC). The Head of NRL SSC acts for the Commanding Officer in dealing with local Naval, federal, and civil activities and personnel on matters relating to NRL SSC support activities and facilities, community and multicommand issues, and safety and disaster control measures.

Support functions include security, public affairs, safety, information systems, and support services to include management and administration, facilities, and technical information.

Personnel: 27 full-time civilian

Key Personnel

Name	Title	Code
Mr. G.R. Bower	Head	7030
Mr. R.H. Swanton	Head, Security Office	7030.1
Ms. C.L. Gilroy	Administrative Officer	7030.2
Mr. K.H. Geistfeld	Head, Safety / Environmental Office	7030.5
Mr. W.B. Eslick	Head, Operations Services Office	7031
Ms. C.C. Wilkinson	Head, Supply Resource Management Unit	7031.1
Mr. W.B. Eslick	Head, Facilities Services Unit	7031.2
Mr. R.W. Burke	Head, Technical Information Systems Office	7032
Ms. M.H. Banker	Head Publications / Graphics Unit	7032.1
Ms. J.P. Ratliff	Head, Classified Library	7032.2
Ms. M.P. Rotundo	Head, Public Affairs Unit	7032.3
Mr. R.W. Burke	Head, Information Systems Unit	7032.4

Point of contact: Mr. G.R. Bower, Code 7030, (228) 688-4010; DSN 485-4010

*Acting

Acoustics Division

Code 7100
Staff Activity Areas

Special programs management
System concepts and studies

USN Journal of Underwater Acoustics

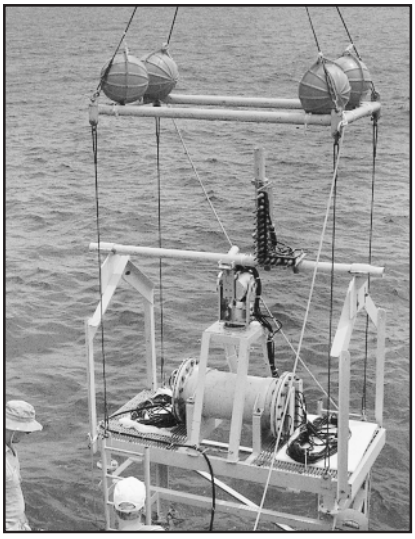
Research Activity Areas

Acoustic Signal Processing

Random media propagation
Limits of acoustic array performance
Underwater acoustic communications
Undersea noise signal characterization and modeling
Surf zone noise generation
Shallow water acoustic surveillance methods
Fish absorption of acoustic signals
Geophysical inversion
Matched field processing and inversion
High-frequency acoustic flow visualization

Physical Acoustics

Structural acoustics
Active sound control
Fiber-optic acoustic sensors
Acoustics of coatings
Dynamics of complex structures
Target strength / radiation modeling
Acoustic transduction
Inverse scattering



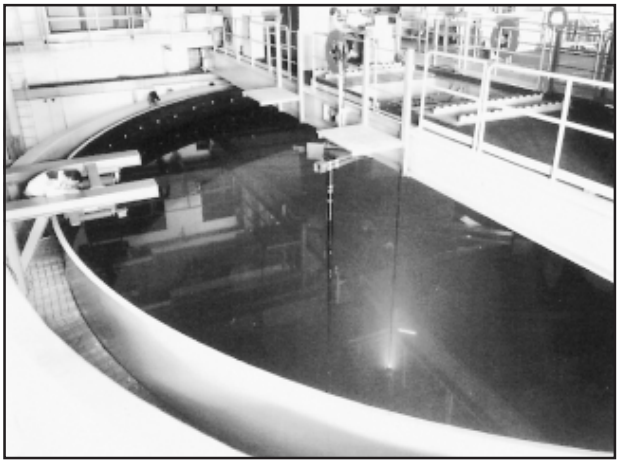
Deployment of high-frequency acoustics tower

Acoustic Systems

Ocean boundary scattering
Shallow water active classification
Statistical characterization of reverberation
Active sonar performance modeling
Matched field processing
Acoustic inversion techniques
Acoustic propagation
Nonlinear signal propagation
Acoustics of bubbly media
Tactical decision aids

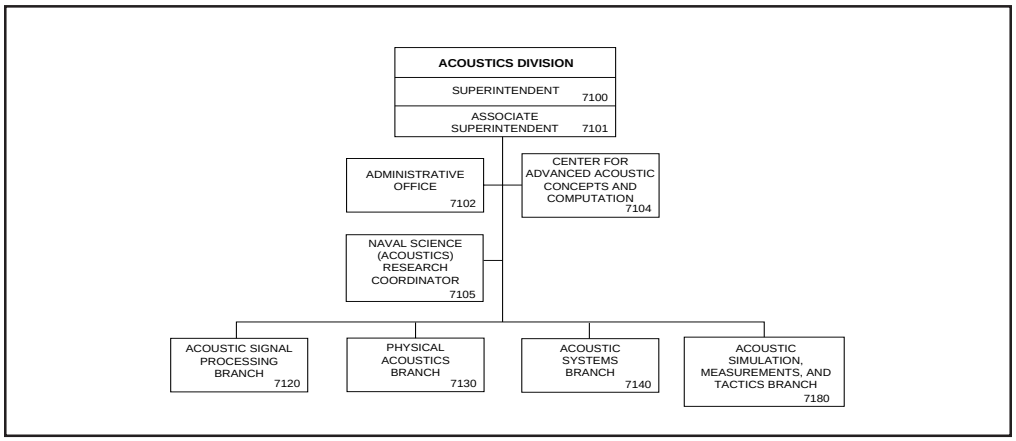
Acoustic Simulation, Measurements, and Tactics

Wave propagation and scattering models
Ocean ambient noise models and simulation
Supercomputer acoustic models
Fleet application models and simulation
Tactical oceanography simulations
Warfare effectiveness studies
Environmental assessments
High-frequency acoustics
Coastal acoustics
Biologic volume reverberation
Shallow-water acoustics
Artic environemntal acoustic
Seafloor scattering



Structural acoustic studies in the one-million gallon Acoustic Holographic Pool Facility

DR. E.R. FRANCHI



Basic Responsibilities

The Acoustics Division conducts basic and applied research in undersea physics. The basic research areas are signal processing; ocean acoustics and the associated description of the ocean environment as it impacts advanced systems; and physical acoustics. The applied spectrum includes developing and proving system concepts; signal processing for active and passive detection, tracking, and classification of underwater targets; echo strength; structural acoustics; large area assessment techniques; and development of processing systems and techniques. Also included are basic and applied research in simulations and tactics as influenced by the environment. The Division program is interactive with the ONR Contract Research Program and other research laboratories, both U.S. and foreign.

Personnel: 127 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Dr. E.R. Franchi	Superintendent	7100
Vacant	Associate Superintendent	7101
Mrs. N.J. Beauchamp	Administrative Officer	7102
Vacant	Head, Center for Advanced Acoustic Concepts and Computation	7104
LCDR S.P. Sopko, USN	Naval Science (Acoustics) Research Coordinator	7105
Dr. M.H. Orr	Head, Acoustic Signal Processing Branch	7120
Dr. J.A. Bucaro	Head, Physical Acoustics Branch	7130
Mr. L.B. Palmer	Head, Acoustic Systems Branch	7140
Dr. S.A. Chin-Bing	Head, Acoustic Simulation, Measurements, and Tactics Branch	7180

Point of contact: Dr. E.R. Franchi, Code 7100, (202) 767-3482

Remote Sensing Division

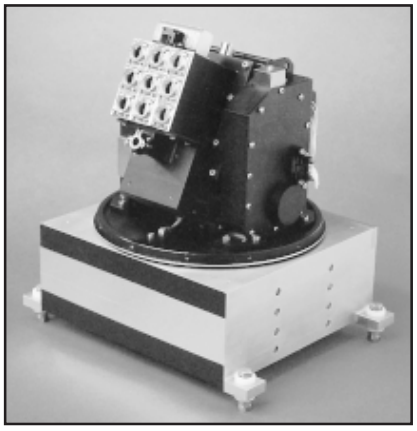
Code 7200
Research Activity Areas

Remote Sensing

- Sensors
  - SAR
  - Imaging RAR
  - Passive microwave imagers
  - CCDs and focal plane arrays
  - Fabry-Perot spectrometers
  - Imaging spectrometers
  - Optical interferometers
  - Spaceborne and airborne systems
- Areas
  - Radiative transfer modeling
  - Coastal oceans
  - Marine ocean boundary layer
  - Polar ice
  - Middle atmosphere
  - Global ocean phenomenology
  - Environmental change
  - Ocean surface wind vector

Astrophysics

- Optical interferometry
- Radio interferometry
- Fundamental astrometry and reference frames
- Star formation
- Stellar atmospheres and envelopes
- Interstellar medium, interstellar scattering
- Pulsars
- Low-frequency astronomy



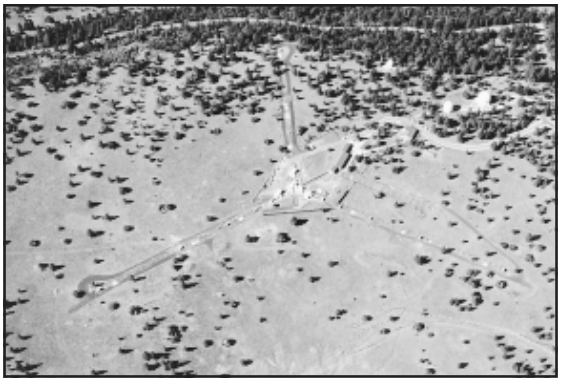
Optical Head Assembly (OHA) of the Polar Ozone and Aerosol Measurement (POAM-II) experiment payload

Physics of Atmospheric/Ocean Interaction

- Mesoscale, fine-structure, and microstructure
- Aerosol and cloud physics
- Mixed layer and thermocline applications
- Sea-truth towed instrumentation techniques
- Turbulent jets and wakes
- Nonlinear and breaking ocean waves
- Stratified and rotating flows
- Turbulence modeling
- Boundary layer hydrodynamics
- Marine hydrodynamics
- Computational hydrodynamics

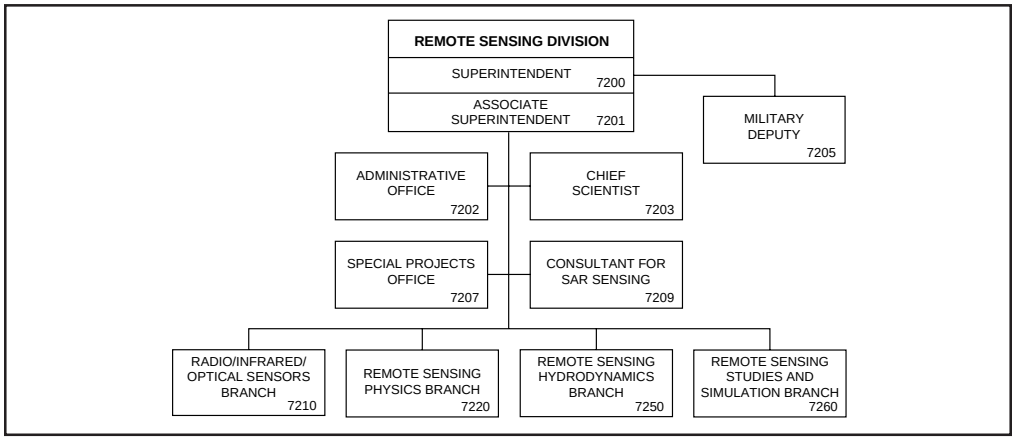
Imaging Research/Systems

- Remotely sensed signatures analysis / simulation
- Real-time signal and image processing algorithm / systems
- Image data compression methodology
- Image fusion
- Automatic target recognition
- Scene / sensor noise characterization
- Image enhancement / noise reduction
- Scene classification techniques
- Radar and laser imaging systems studies
- Coherent / incoherent imaging sensor exploitation
- Numerical modeling simulation
- Environmental imagery analysis



The Navy Prototype Optical Interferometer produces the highest angular resolution images ever made at optical wavelengths. Its four astrometric elements (the rectangular huts) provide extremely precise star positions for use by the U.S. Naval Observatory in navigation and time keeping. The imaging elements are mounted on piers extending out the "Y" configuration. Light from all the telescopes is carried down evacuated pipes and combined in the optics laboratory to produce images of stellar surfaces.

DR. P.R. SCHWARTZ



Basic Responsibilities

The Remote Sensing Division conducts a program of basic research, science, and applications aimed at the development of new concepts for sensors and imaging systems for objects and targets on the Earth, in the near-Earth environment, and in deep space. The research, both theoretical and experimental, deals with discovering and understanding the basic physical principles and mechanisms that give rise to target and background emission and to absorption and emission by the intervening medium. The accomplishment of this research requires the development of sensor systems technology. The development effort includes active and passive sensor systems to be used for the study and analysis of the physical characteristics of phenomena that give rise to naturally occurring background radiation, such as that caused by the Earth's atmosphere and oceans, as well as man-made or induced phenomena such as ship / submarine hydrodynamic effects. The research includes theory, laboratory, and field experiments leading to ground-based, airborne or space systems for use in such areas as remote sensing, astrometry, astrophysics, surveillance, nonacoustic ASW, and improved meteorological support systems for the operational Navy. Special emphasis is given to developing space-based platforms and exploiting existing space systems.

Personnel: 99 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Dr. P.R. Schwartz	Superintendent	7200
Mr. C. Hoffman	Associate Superintendent	7201
Mrs. M.K. Smith	Administrative Officer	7202
Vacant	Chief Scientist	7203
CDR R.T. Barock, USN	Military Deputy	7205
Dr. D.T. Chen	Head, Special Projects Office	7207
Dr. S.A. Mango	Consultant for SAR Sensing	7209
Dr. L. Rickard	Head, Radio / Infrared / Optical Sensors Branch	7210
Dr. R. Bevilacqua	Head, Remote Sensing Physics Branch	7220
Dr. R. Mied	Head, Remote Sensing Hydrodynamics Branch	7250
Dr. G.A. Keramidas	Head, Remote Sensing Studies and Simulation Branch	7260

Point of contact: Dr. P.R. Schwartz, Code 7200, (202) 767-2351

Oceanography Division

Code 7300
Staff Activity Areas

Special studies

Research Activity Areas

Ocean Dynamics and Prediction

- Ocean prediction
  - Large scale
  - Arctic
  - Shipboard
  - Data assimilation
  - Coastal and semi-enclosed sea
- Ocean observing system simulation
- Coastal scene generation

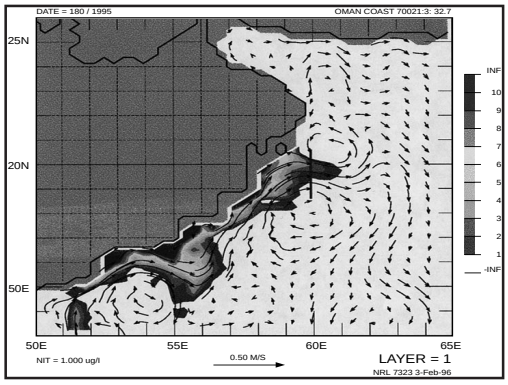
Ocean Sciences

- Mesoscale dynamics
- Coupled systems
  - Air sea interaction
  - Biodynamics
  - Bio-optical models
- Small scale dynamics
  - Small scale turbulence
  - Bubbles / waves
  - Optics

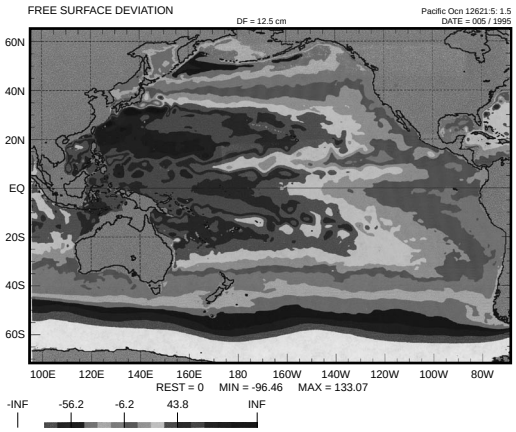
Remote Sensing Applications

- Remote sensor algorithm development
- Color / hyperspectral applications
- High resolution littoral characterization
- Remote sensor applications to biological processes
- Satellite oceanographic tactical applications

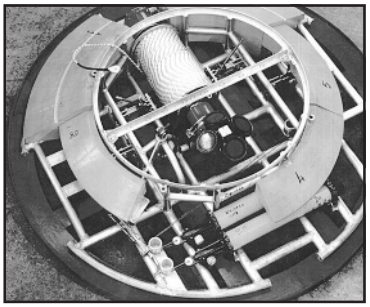
Optical mooring equipment for shallow water showing attenuation and absorption meters and irradiance sensors



Gulf of Mexico NOAA AVHRR Sea Surface Temperature Image illustrating the mesoscale and shelf processes. The position of the warm Loop current (dark) is shown in the eastern gulf. NRL collects and processes all AVHRR and SeaWifs imagery to understand the dynamics and evolution of oceanographic events that affect our coastal waters. Imagery can be viewed on the NRL, SSC website.

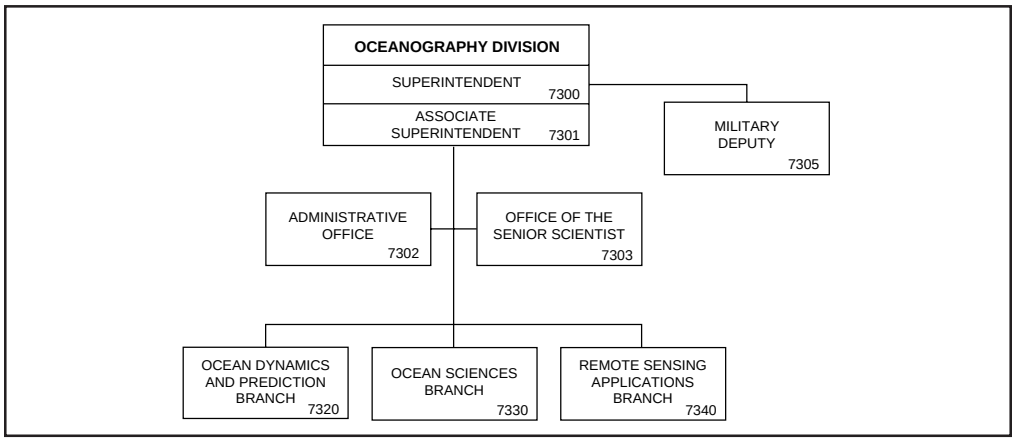


NRL layered ocean model output of sea surface height for Pacific Ocean, 5 January 1995. This model has been transitioned to FNMOC .



NRL's ten 300 kHz ADCPs are matched with trawl-resistant bottom mounts. This photo shows a bottom mount with its exterior fiberglass shell and some internal buoyancy segments removed. The internal recording instruments collect frequent profiles of horizontal current for intervals of up to several months. A wave and tide gauge may also be included in the housing. With an operating depth of 300 m, the instruments permit operations nearly every-where on the world's continental shelves.

VACANT



Basic Responsibilities

The Oceanography Division conducts basic and applied research in biological, physical, and dynamical processes and their description and modeling in open ocean, coastal, and semi-enclosed seas; exploiting satellite and airborne sensors for environmental information; investigation and application of microbiological processes to Navy problems. The oceanographic research is both theoretical and experimental in nature and is focused on understanding and modeling ocean, coastal, and littoral area hydro/thermodynamics, circulation, waves, ice dynamics, air-sea exchange, optics, and small and microscale processes. Analytical methods and algorithms are developed to provide quantitative retrieval of geophysical parameters of Navy interest from state-of-the-art sensor systems. The Division work includes analysis of biological processes that mediate and control bioluminescence distributions in the oceans, coastal, and littoral regions and microbially induced corrosion/metal microbe interaction. The Division programs are designed to be responsive to and to anticipate Naval needs. Transition of Division products to the Department of Defense (DoD), Navy systems developers, operational Navy and civilian (dual use) programs is a primary goal. The Division's programs are coordinated and interactive with other NRL programs and activities, ONR's research programs, and other government agencies involved in oceanographic activities. The Division also collaborates and cooperates with scientists from the academic community and other U.S. and foreign laboratories.

Personnel: 84 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Vacant	Superintendent	7300
Dr. E.M. Stanley	Associate Superintendent	7301
Mrs. I.S. DeSpain	Administrative Officer	7302
Dr. B.J. Little	Head, Office of the Senior Scientist	7303
CDR C.J. Hall, USN	Military Deputy	7305
Dr. J.M. Harding	Head, Ocean Dynamics and Prediction Branch	7320
Mr. S. Payne	Head, Ocean Sciences Branch	7330
Dr. W. Campbell	Head, Remote Sensing Applications Branch	7340

Point of contact: Mrs. I.S. DeSpain, Code 7302, (228) 688-4114; DSN 485-4114

Marine Geosciences Division

Code 7400
Research Activity Areas

Marine Geology
- Sedimentary processes
- Foreshore sediment transport
- Pore fluid flow
- Diapirism, volcanism, faulting, mass movement
- Sediment geochemistry
- Hydrate distribution, formation and dissociation

Marine Geophysics
- Seismic wave propagation
- Earthquake seismology
- Physics of low-frequency acoustic propagation
- Acoustic energy interaction with topography and inhomogeneities
- Detection, localization, and characterization of events
- Geomagnetic modeling

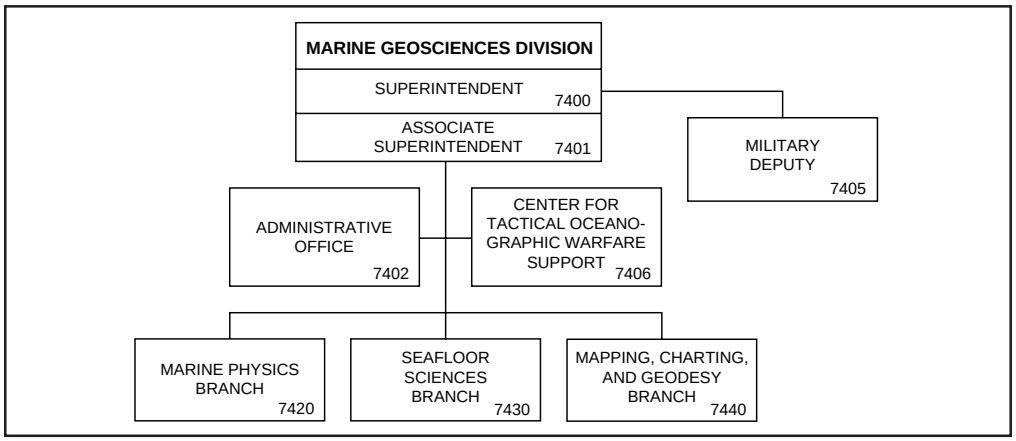
Marine Geotechnique
- Sediment classification
- Sediment microfabric
- Geoacoustic modeling
- Geotechnical properties of sediments

Mapping and Charting
- Digital database design
- Digital product analysis and standardization
- Data compression techniques and exploitation
- Hydrographic survey techniques
- Bathymetry extraction techniques from remote and acoustic imagery
- Utility software development for digital mapping databases
- Observation and modeling of nearshore morphodynamics

In situ and Laboratory Sensors
- High-resolution subseafloor 2-D and 3-D seismic imaging
- Laser / hyperspectral bathymetry / topography
- Swath acoustic backscatter imaging
- Sediment pore water pressure
- Compressional and shear wave velocity
- Airborne geophysics, gravity, and magnetics
- Seafloor magnetic fluctuation
- Sediment microfabric change with pore fluid and / or gas change

The Marine Geosciences Division has assisted in the development of video imagery field stations used to collect data on nearshore hydrodynamic and morphodynamic processes. These automated stations operate over long time periods (from weeks to years) and present information useful to the military and to scientists in a variety of formats. This time exposure image from Camp Pendleton, CA shows the time-averaged pattern of waves breaking over two alongshore sandbars. Determination of the camera orientation relative to known ground control positions (using the dark circular targets) allows quantification of parameters such as bar position, beach width, dominant wave period, incidence angle, and alongshore current speed.

DR. H.C. EPPERT, JR.



Basic Responsibilities

The Marine Geosciences Division has responsibility for planning and executing a broad spectrum research, development, and technology program in marine geology, geophysics, geoacoustics, geotechniques, and mapping, charting, and geodesy (MC&G). The program is designed to provide necessary digital databases, geoacoustic and geophysical models, and simulations to support training, system design, performance prediction, and operational needs of the Navy.

The applied portion of the program is directed toward (1) quantitatively predicting the effects of the seafloor and associated geophysical, geomorphological, and geoacoustic variability on performance of present and emerging naval systems, operations, and plans, and (2) developing technology and techniques to rapidly acquire, process, and analyze MC&G (gravity, magnetics, and bathymetry) and other types of geological, geophysical, and geoacoustic information to meet existing digital database requirements of the Chief of Naval Operations (CNO), National Image and Mapping Agency (NIMA), and system commands.

The Division serves as the focal point in the Navy and Marine Corps for assessing and identifying MC&G requirements, including prototype digital MC&G products and product coordination. The program is keyed to and responsive to priorities identified by NRL, Office of Naval Research, CNO, the System Commands, and NIMA. Close coordination and interaction with the Warfare Centers is essential to the success of this program with transition of Division products to system developers and the operational Navy a primary goal. The Division program is coordinated and interactive with other NRL programs and activities, ONR's Research Program Department, NOAA, USGS, NSF, and other government agencies involved in seafloor activities. The Division collaborates and cooperates with scientists from the academic community, other U.S. and foreign laboratories, and industry.

Personnel: 71 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Dr. H.C. Eppert, Jr.	Superintendent	7400
Dr. P.J. Valent	Associate Superintendent	7401
Ms. C.L. Gilroy	Administrative Officer	7402
LCDR R. McDowell, USN*	Military Deputy	7405
Vacant	Director, Center for Tactical Oceanographic Warfare Support	7406
Mr. H.S. Fleming	Head, Marine Physics Branch	7420
Mr. S.G. Tooma	Head, Seafloor Sciences Branch	7430
Mr. M.M. Harris	Head, Mapping, Charting, and Geodesy Branch	7440

Point of contact: Ms. Margaret Gill, Code 7400, (228) 688-44650; DSN 485-4650

*Acting

Marine Meteorology Division

Code 7500
Research Activity Areas

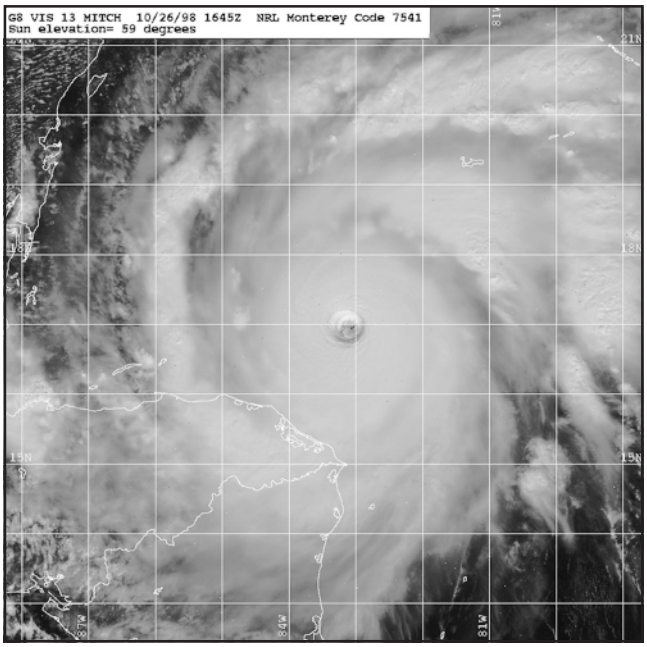
Numerical Weather Prediction
- Global
- Mesoscale
- On-scene
- Large eddy simulation
- Boundary layer
- Coastal
- Massively parallel computing
- Coupled ocean/atmosphere/wave
- Tropical cyclones
- Aerosols
- Topographically forced flow

Data Assimilation
- Optimum interpolation
- Variational analysis
- Quality control
- Synthetic soundings
- Remotely sensed data
- Physical initialization
- Direct radiance assimilation
- Radar data assimilation

Shipboard Support
- Tactical Environmental Support System
- Data fusion
- Visualization
- Port studies
- Typhoon havens
- Forecaster handbooks
- Expert systems
- CD-ROMs

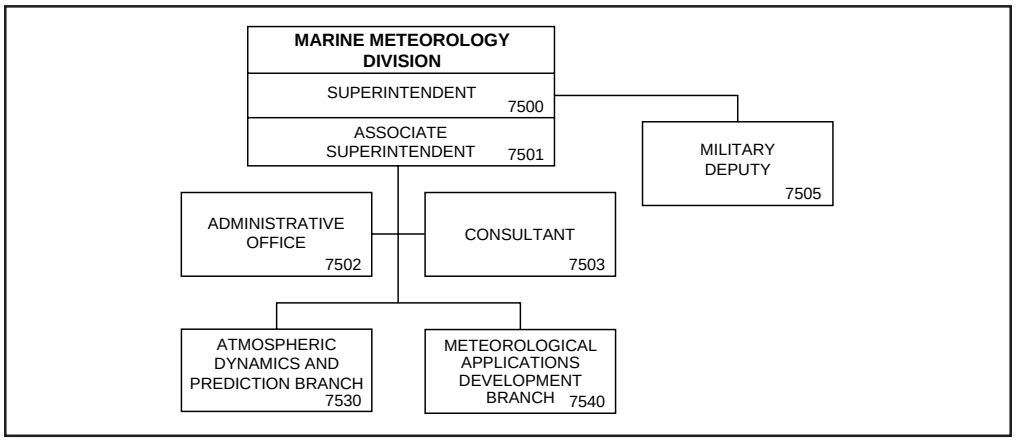
Satellite Data/Imagery
- Automated cloud classification
- Satellite imagery analysis
- Case study development
- Multisensor data fusion
- Tropical cyclone intensity
- Water vapor-tracked winds
- Cloud-tracked winds

Decision Aids
- Refractivity
- Strike warfare
- Ship routing
- Fog/turbulence/icing
- Electromagnetic
- Electro-optical



Visible image for Hurricane Mitch on October 26, 1998 at 1645Z

DR. P.E. MERILEES



Basic Responsibilities

The Marine Meteorology Division conducts a basic and applied research and development program designed to improve the basic understanding of atmospheric processes that impact Fleet operations and to develop information systems that analyze, simulate, predict, and interpret the structure and behavior of these processes and their effect on naval weapons systems. Basic research includes work in air-sea interaction, orographic and fetch-limited, atmospheric predictability and targeted observations, and aerosols. Applied research spans the gamut from development of both central-site and on-scene analysis / forecast systems, to the development of tactical decision aids for operations support. NRL-Monterey (NRL-MRY) is co-located with the Fleet Numerical Meteorology and Oceanography Center (FNMOC) and has developed and transitioned to FNMOC the global and mesoscale forecast models and satellite applications products that form the backbone of the Navy's worldwide weather forecasting capability. In addition, NRL is forging new ground by transitioning similar products and capabilities to the Navy's regionalized meteorology and oceanography centers around the globe. Specialties of the Division include numerical weather prediction, data assimilation and quality control, marine boundary layer processes, on-scene atmospheric environment assesssment, environmental decision aids, database management, and satellite data interpretation and application.

Personnel: 63 full-time civilian; 3 full-time military

Key Personnel

Name	Title	Code
Dr. P.E. Merilees	Superintendent	7500
Ms. P. Phoebus	Associate Superintendent	7501
Ms. C. Marks	Administrative Officer	7502
Dr. J. McCarthy	Consultant	7503
LCDR C.A. Springer, USN	Military Deputy	7505
Dr. R.M. Hodur	Head, Atmospheric Dynamics and Prediction Branch	7530
Dr. T.L. Tsui	Head, Meteorological Applications Development Branch	7540

Point of contact: Dr. P.E. Merilees, Code 7500, (408) 656-4721; DSN 878-4721

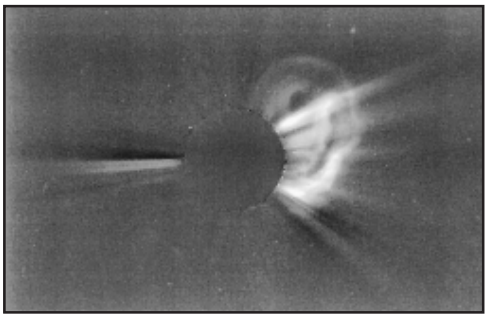
Space Science Division

Code 7600
Research Activity Areas

Space Weather and Atmospheric Physics

Remote sensing of the ionosphere and thermosphere
Middle atmospheric investigations
Global modeling
Upper atmospheric physics
Space astronomy
X-ray observation, analysis, and theory of space astronomical sources
Ultraviolet astronomy
Gamma-ray astrophysics, solar-flare gamma rays, and space cosmic ray particle environment

NRL SOHO/LASCO solar coronagraph image showing the progress of a coronal mass ejection (CME), which occurred on October 5, 1996. CMEs travel outward from the Sun with velocities on the order of 1000 km/s and frequently interact with the Earth's magnetosphere resulting in geomagnetic disturbances.



French and English colleagues assist NRL scientists preparing the LASCO wide-field coronagraph for flight on SOHO

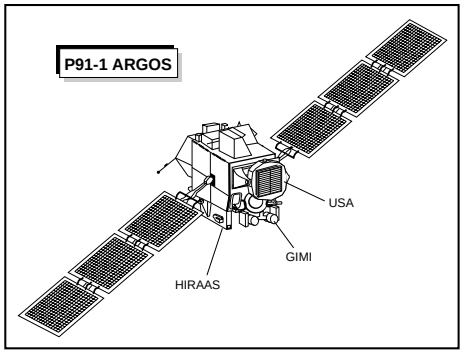
Solar Physics

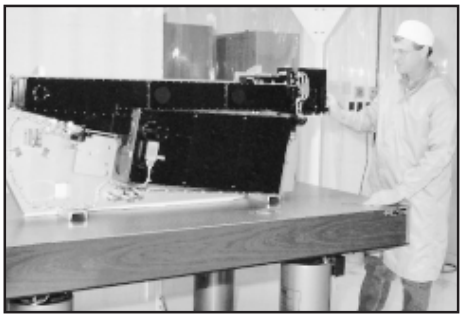
Solar ultraviolet and visible light spectroscopy and photometry from rockets, satellites, and the Space Shuttle

Solar-Terrestrial Relationships

Solar X-ray/EUV plasma diagnostics; coronal effects on Earth

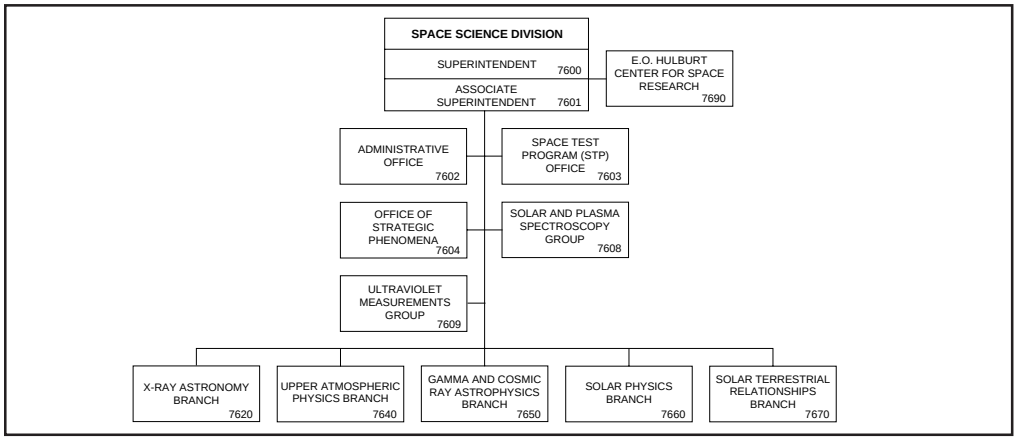
Three Space Science Division experiments flew on the Air Force STP ARGOS satellite in early 1999. HIRAAS contains three ultraviolet spectroscopic instruments to study the Earth's thermosphere and ionosphere. GIMI consists of two electronic imaging cameras tuned to different EUV/FUV wavelength bands to obtain global data on the upper atmosphere as well as stars. USA is an X-ray timing and navigation experiment that will investigate the use of exotic astrophysical objects for autonomous time and position measurements.





The Middle Atmosphere High Resolution Spectrograph Investigation (MAHRSI) is an ultraviolet spectroscopy experiment developed in the Space Science Division as a Space Shuttle deployed payload. On Shuttle flight STS-66 in November 1994, MAHRSI provided the first global maps of hydroxyl (OH) and measured the gases in the middle atmosphere (35–120 km) that control the global distribution of ozone.

DR. H. GURSKY



Basic Responsibilities

The Space Science Division conducts research in the fields of astronomy and astrophysics, solar-terrestrial physics, and atmospheric science. Satellites, rockets, and ground-based facilities are used to obtain information on radiation from the Sun and celestial sources, and to study the behavior of the ionosphere and high atmosphere. Research results are of importance to radio communications, to use of the space environment, to weather prediction, and to the fundamental understanding of natural radiation and geophysical phenomena. The Superintendent also acts as Chief Scientist of the E.O. Hulburt Center for Space Research, created to provide research opportunities in space science to appointees from universities.

Personnel: 87 full-time civilian

Key Personnel

Name	Title	Code
Dr. H. Gursky	Superintendent	7600
Dr. F.J. Giovane	Associate Superintendent	7601
Mrs. B.M. Shea	Administrative Officer	7602
LT D.A. Bailey, USN	Space Test Program Officer, Kirtland AFB, NM	7603
Dr. H.M. Heckathorn	Head, Office of Strategic Phenomena	7604
Dr. U. Feldman	Head, Solar and Plasma Spectroscopy Group	7608
Dr. G. Carruthers	Head, Ultraviolet Measurements Group	7609
Mr. G.G. Fritz	Head, X-Ray Astronomy Branch	7620
Dr. R.R. Meier	Head, Upper Atmospheric Physics Branch	7640
Dr. J.D. Kurfess	Head, Gamma and Cosmic Ray Astrophysics Branch	7650
Dr. R.A. Howard	Head, Solar Physics Branch	7660
Dr. G.A. Doschek	Head, Solar Terrestrial Relationships Branch	7670
Dr. H. Gursky†	Chief Scientist, E.O. Hulburt Center for Space Research	7690
Dr. H. Friedman	Chief Scientist (Emeritus), E.O. Hulburt Center for Space Research	7690

Point of contact: Mrs. B.M. Shea, Code 7602, (202) 767-3631

†Additional duty

Naval Center for Space Technology

NAVAL CENTER FOR SPACE TECHNOLOGY

Code 8000

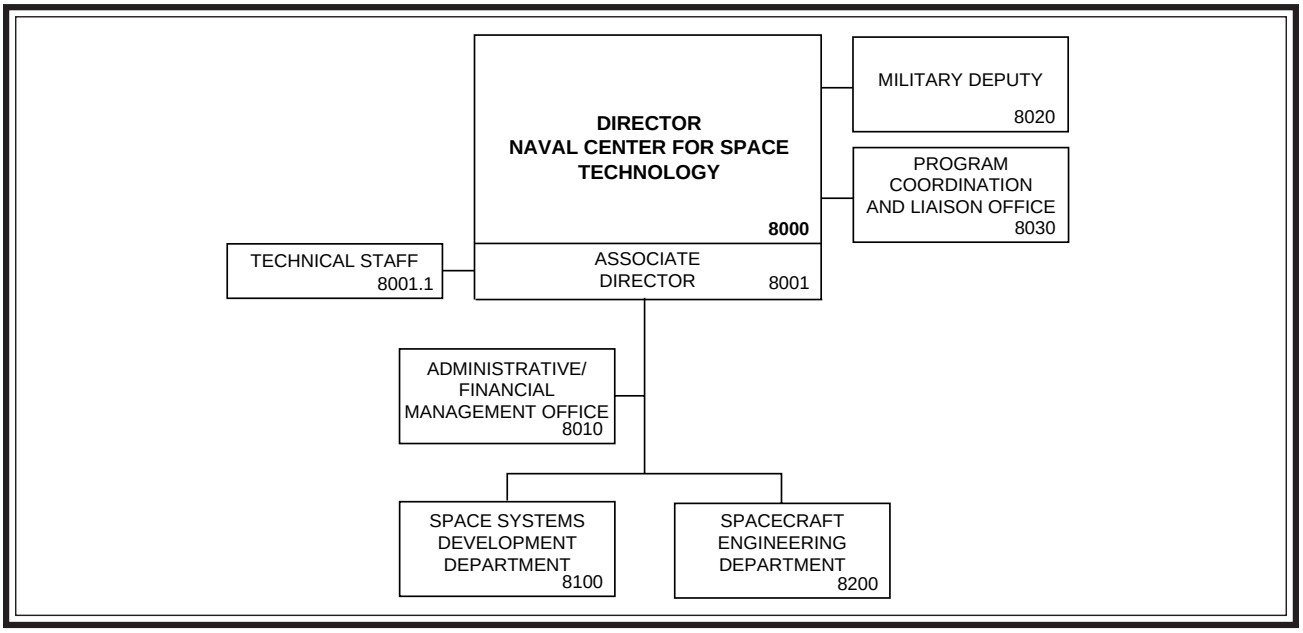
In its role to preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems that support naval missions, the Naval Center for Space Technology activities extend from basic and applied research through advanced development in all areas of interest to the Navy space program. These activities include developing spacecraft, systems using these spacecraft, and ground command and control stations. Principal functions of the Center include understanding and clarifying requirements, recognizing and prosecuting promising research and development, analyzing and testing systems to quantify their capabilities, developing operational concepts that exploit new technical capabilities, system engineering to allocate design requirements to subsystems, and engineering development and initial operation to test and evaluate selected spacecraft subsystems and systems. The Center is a focal point and integrator for those divisions at NRL whose technologies are used in space systems. The Center also provides systems engineering and technical direction assistance to system acquisition managers of major space systems. In this role, technology transfer is a major goal and motivates a continuous search for new technologies and capabilities and the development of prototypes that demonstrate the integration of such technologies.

Director of Naval Center for Space Technology

Mr. P.G. Wilhelm was born in New York City on July 26, 1935. He attended Purdue University, where he received a B.S.E.E. degree in 1957. By 1961, he had completed all the course work for an M.S.E. degree from George Washington University.

From 1957 to 1959, Mr. Wilhelm served as an electrical engineer with Stewart Warner Electronics where he was assigned to a project to redesign the UPM-70, a Navy radar test set. In March 1959, he joined the Naval Research Laboratory as an electrical scientist in the Electronics Division. In December 1959, he joined the Satellite Techniques Branch. In 1961, he became Head of the Satellite Instrument Section; in 1965, he became Head of the Satellite Techniques Branch; and in 1974, Head of the Spacecraft Technology Center. In these positions, he performed satellite system design, equipment development, environmental testing, launch operations, and orbital data handling. In 1981, he was named the Superintendent of the Space Systems and Technology Division, the Navy's principal organization, or lead Laboratory, for space. He is credited with contributions in the design, development, and operation of 82 scientific and Fleet-support satellites. He has been awarded five patents. In October 1986, he was appointed Director of the newly established Naval Center for Space Technology. The Center's mission is to "preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems which support naval missions."

Mr. Wilhelm has been recognized with numerous awards including the Navy's Meritorious Civilian Service Award, the Distinguished Civilian Service Award, the Presidential Meritorious Executive Award, the Institute of Electrical and Electronics Engineers Aerospace and Electronic Systems Group Man of the Year Award, the NRL E.O. Hulburt Annual Science and Engineering Award, the Dexter Conrad Award, the Rotary National Stellar Award, and in May 1999 Mr. Wilhelm received the American Institute of Aeronautics and Astronautics (AIAA) Goddard Astronautics Award. He also has been elected a Fellow of the Washington Academy of Sciences and a Fellow of the American Institute of Aeronautics and Astronautics, and in 1997 was elected to the National Academy of Engineering. Mr. Wilhelm is also the first recipient of a new NRL award, the R.L. Easton Award, for excellence in engineering.



Key Personnel

Name	Title	Code
Mr. P.G. Wilhelm	Director, Naval Center for Space Technology	8000
Mr. F.V. Hellrich	Associate Director	8001
	Technical Staff	8001.1
Mrs. B.L. Fleming	Head, Administrative/Financial Management Office	8010
LCDR J. Legaspi	Military Deputy	8020
Mr. P. Regeon	Head, Program Coordination and Liaison Office	8030
Mr. R.E. Eisenhauer	Superintendent, Space Systems Development Department	8100
Mr. H.E. Senasack	Superintendent, Spacecraft Engineering Department	8200

Point of contact: Mr. F.V. Hellrich, Code 8001, (202) 767-6549

Space Systems Development Department

Code 8100
Research Activity Areas

Advanced Space Systems Technologies
- Space systems architectures and requirements
- Advanced payloads and optical systems
- Controllers, processors, and signal processing
- Data management systems and equipment
- Embedded algorithms and software

Astrodynamics
- Orbit determination, performance assessment and verification
- Computer simulation of space systems
- Orbit and attitude dynamics
- Autonomous navigation, star catalog development
- GPS space applications and geolocation systems
- Mission analysis, operations and satellite coverage studies

Command, Control, Communications, Computers, and Intelligence
- Communications theory and systems
- Tracking, telemetry, and control systems
- Satellite ground station engineering and implementation
- Transportable and fixed ground antenna systems
- High-speed fixed and mobile ground data collection, processing, and dissemination systems
- Tactical communication systems

The Joint Combat Information (JCIT) uses advanced RF and digital technology to provide unprecedented battlefield connectivity and combat information processing in a compact, modular, on-the-fly reconfigurable unit with an open system architecture. The JCIT contains up to eight multiband transceivers, embedded INFOSEC, message processing, date storage, crypto key management, GPS, and power supplies in a 19" rack mount or three-fourths ATR chassis weighing less than 50 lbs. It is capable of simultaneously transmitting, receiving, encrypting, decrypting, and processing voice and video information. The system is software reprogrammable to support a variety of mission scenarios and achieves much of its funcitonality and diversity through software. The design of the JCIT permits interoperability with legency systems as well as interservice, international, and coaliton partner systems. Having been designed for airborne (including carrier-based platforms) use, the JCIT is fully qualified for land, Naval surface and subsurface applications.

Space Electronic Systems Development
- Space system concept definition, design, and implementation including hardware and software
- Detailed electrical / electronic design of electronic and electromechanical systems and components
- Implementation of real time flight software, and embedded command, control and telemetry software
- Design and verification of real time embedded multiprocessor software
- Spacecraft antenna systems
- Space systems fabrication, test, and integration
- Launch and on orbit support
- Space test systems and electronic launch support equipment

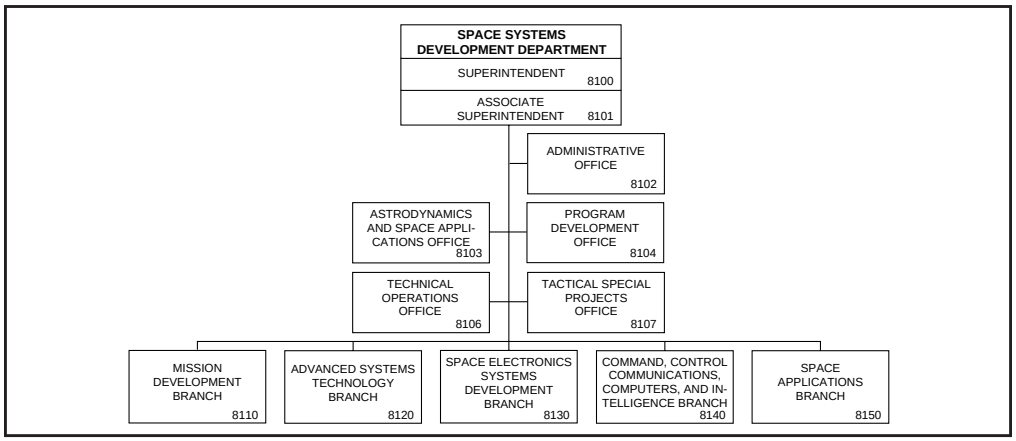
Space Electronic Warfare
- Design criteria for counter-surveillance and counter-targeting
- Data search, analysis, and synthesis of information related to special sensor performance

Space Mission Development
- Mission development and requirements definition
- Systems engineering and analysis
- Concepts of operations and mission simulations
- Mission evaluation and performance assessments

Space Surveillance, Navigation, and Time
- Advanced navigation satellite technology
- Precise Time and Time Interval (PTTI) technology
- Atomic- time / frequency standards / instrumentation
- Passive and active ranging techniques
- Detection and precision tracking of orbiting objects from space and ground

The "ICEBOX" is a transportable satellite communicatjions and relay station that has been deployed around the world in support of Naval operations. ICEBOX is transportable via a C141 Aircraft and can provide satellite communications and in-theater monitoring capabilities for a number of situations. ICEBOX has a number of innovative features that include remote operations and troubleshooting, automatic transmit and receive, multifuncitonal antennas, and innovative processing techniques.

MR. R.E. EISENHAUER



Basic Responsibilities

The Space Systems Development Department (SSDD) is the space and ground support systems research and development organization of the Naval Center for Space Technology. The primary objective of the SSDD is to develop space systems to respond to Navy, DoD, and national mission requirements with improved performance, capacity, reliability, efficiency, and / or life cycle cost. The Department must derive system requirements from the mission, develop architectures in response to these requirements, and design and develop systems, subsystems, equipment, and implementation technologies to achieve the optimized, integrated operational space and ground system. These development responsibilities extend across the entire space / ground spectrum of hardware, software, and advanced technologies, including digital processing and control, analog systems, power, communications, command and telemetry, radio frequency, optical, payload, and electromechanical systems, as well as systems engineering.

Personnel: 245 full-time civilian

Key Personnel

Name	Title	Code
Mr. R.E. Eisenhauer	Superintendent	8100
Mr. G.E. Price	Associate Superintendent	8101
Ms. M.R. Hudson	Administrative Officer	8102
Mr. J. Middour	Head, Astrodynamics and Space Applications Office	8103
Mr. B.J. Lamb	Head, Program Development Office	8104
Mr. P. Nicholson	Head, Technical Operations Office	8106
Mr. M.T. Powell	Head, Tactical Special Projects Office	8107
Mr. D.L. Pettit*	Head, Mission Development Branch	8110
Mr. W.R. Webster	Head, Advanced Systems Technology Branch	8120
Mr. G.E. Flach	Head, Space Electronics Systems Development Branch	8130
Mr. G. Cooper	Head, Command, Control, Communications, Computers, and Intelligence Branch	8140
Mr. R.L. Beard	Head, Space Applications Branch	8150

Point of contact: Ms. M.R. Hudson, Code 8102, (202) 767-0432

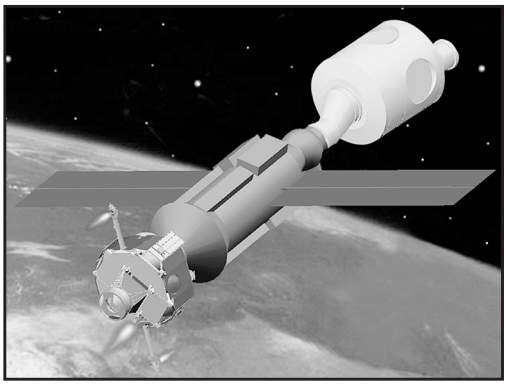
*Acting

Spacecraft Engineering Department

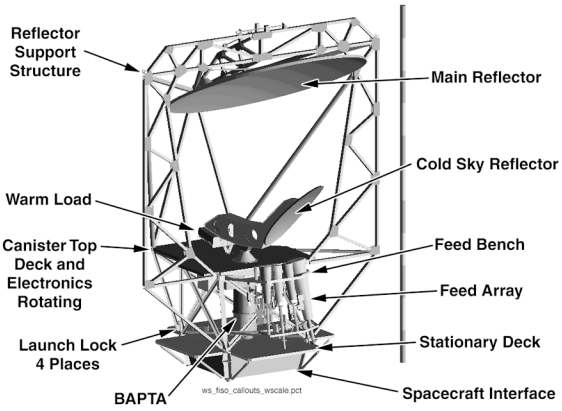
Code 8200
Research Activity Areas

Design, Test, and Processing

Design, fabrication, and testing of NCST spacecraft and hardware:
- Preliminary and detailed design
- Fabrication
- Testing
- Integration onto launch vehicle
- Systems engineering for new spacecraft proposals
- Start-to-finish responsibility for NCST spacecraft mechanical systems



NRL's Interim Control Module (ICM) will provide attitude control and reboost capability for the International Space Station.



WindSat demonstrates the use of Passive Microwave Polarimetry from space to measure the full ocean surface wind field (wind speed and direction).

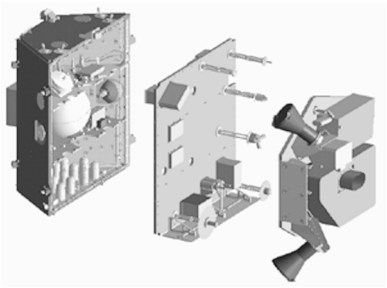
Systems Analysis

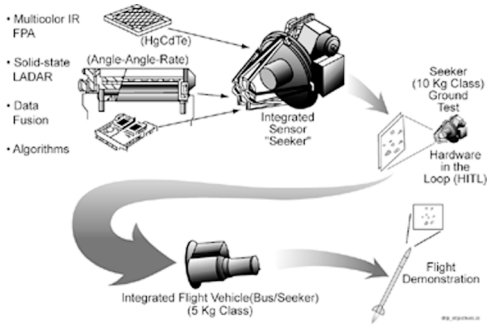
Development and maintenance of a highly competent staff and modern facilities
Research and development in spacecraft technology
Conceptual design trade studies
Integrated engineering design and analysis
Structural and thermal analysis
Development and transition of prototype hardware
Development and integration of experimental payloads

Control Systems

Attitude determination and control systems
Reaction control
Precision pointing
Propulsion systems
Analytical design and mission planning
Navigation, tracking, and orbit dynamics
Expert systems
Flight operations support
Computer simulation
Computer animation
Robotics engineering and control
Spaceborne robotics applications

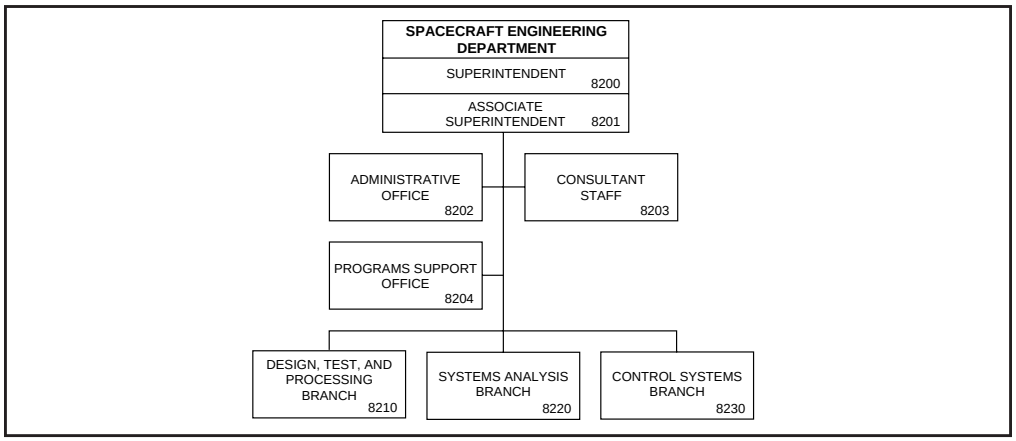
Naval EarthMap Observer (NEMO) will provide Hyperspectral technology applications for coastal ocean and littoral imaging, resource monitoring, and mineral mapping.





Discriminating Interceptor Technology (DITP) demonstrates technologies traceable to NMD and TMD applications to include miniaturized IR and LADAR sensors and sensor fusion processing hardware.

MR. H.E. SENASACK, JR.



Basic Responsibilities

The Spacecraft Engineering Department (SED) is the focal point for the Navy's capability to design and build spacecraft. Activities range from concept and feasibility planning to on-orbit IOC for the NRL's space systems.

The SED provides spacecraft bus expertise for the Navy and maintains an active in-house capability to develop satellites; manages Navy space programs through engineering support and technical direction; in concert with the Space Systems Development Department, designs, assembles and tests spacecraft and space experiments, including all aspects of space, launch, and ground support; analyzes and designs structures, mechanisms, and a variety of control systems, including attitude, propulsion, reaction, and thermal; integrates satellite designs, launch vehicles, and satellite-to-boost stages; functions as a prototype laboratory to ensure that designs can be transferred to industry and incorporated into subsequent satellite hardware builds; and consults with the Navy Program Office on technical issues involving spacecraft architecture, acquisition, and operation.

Personnel: 93 full-time civilian

Key Personnel

Name	Title	Code
Mr. H.E. Senasack, Jr.	Superintendent	8200
Mr. J.P. Schaub	Associate Superintendent	8201
Ms. C. Gross	Administrative Officer	8202
Mr. A. Hull	Consultant mStaff	8203
Ms. C. Warner*	Head, Programs Support Office	8204
Mr. J.A. Hauser II	Head, Design, Test, and Processing Branch	8210
Mr. M.A. Brown	Head, Systems Analysis Branch	8220
Mr. S.A. Hollander	Head, Control Systems Branch	8230

Point of contact: Mr. H.E. Senasack, Jr., Code 8200, 767-6411

*Acting

Technical Output, Fiscal, and Personnel Information

Technical Output

Publications, Presentations, and Patents

The Navy continues to be a pioneer in initiating new developments and a leader in applying these advancements to military requirements. The primary means of informing the scientific and engineering community of the advances made at NRL is through the Laboratory's technical output—reports, articles in scientific journals, contributions to books, papers presented to scientific societies and topical conferences, patents, and inventions.

The figures for Calendar Years 1997 and 1998 presented below represent the output of NRL facilities in Washington, DC; Bay St. Louis, Mississippi; and Monterey, California.

In addition to the output listed, NRL scientists made more than 1,430 oral presentations during 1997 and 1,440 oral presentations during 1998 .

In 1986, Congress enacted the Federal Technology Transfer Act in an effort to encourage the commercial use of technology developed in Federal laboratories. The Act allows Government inventors and the laboratories where they work to share the royalties generated by commercial licensing of their inventions. Also, the Act encourages the establishment of cooperative research and development agreements between laboratories such as NRL and nonfederal entities such as state and local governments, universities, and business corporations. Such cooperative R&D agreements can include the allocation in advance of patent rights on any inventions made under the joint research effort.

The 1986 Act has given additional impetus to the Laboratory's efforts to patent important inventions arising out of its various research programs.

Calendar Year 1997

Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books, and papers in published proceedings	1,119	0	1,119*
NRL Formal Reports	19	17	36
NRL Memorandum Reports	116	14	130
Books	3	0	3
Patents granted			62
Statutory Invention Registrations (SIRs)			5

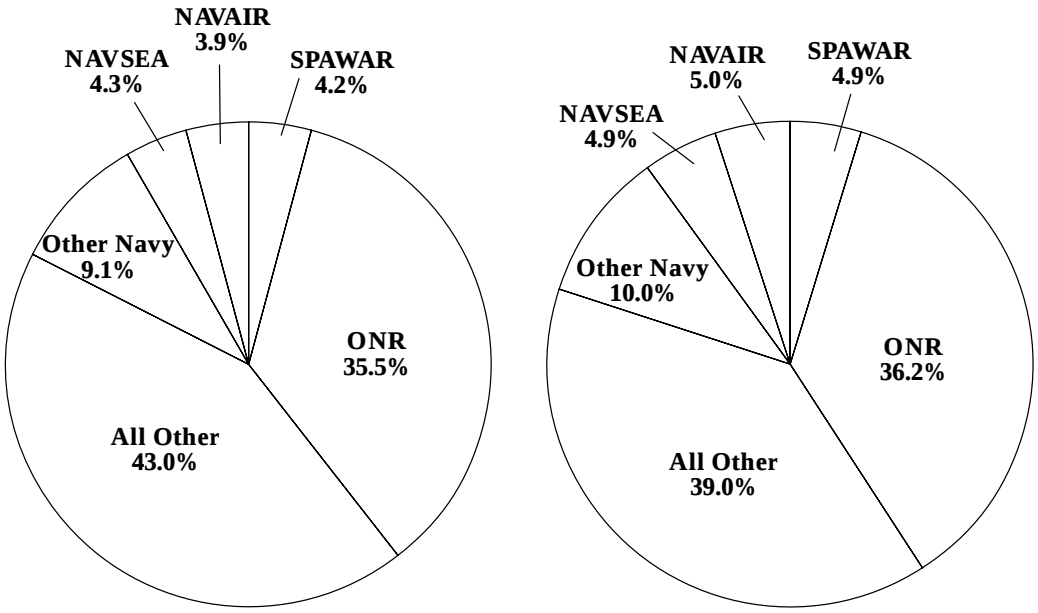
Calendar Year 1998

Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books, and papers in published proceedings	1,274	0	1,274**
NRL Formal Reports	26	3	29
NRL Memorandum Reports	96	9	105
Books	3	0	3
Patents granted			78
Statutory Invention Registrations (SIRs)			6

*This is a provisional total based on information available to the Ruth H. Hooker Research Library and Technical Information Center on January 9, 1998. Additional publications carrying a 1997 publication date are anticipated.

**This is a provisional total based on information available to the Ruth H. Hooker Research Library and Technical Information Center on January 26, 1999. Additional publications carrying a 1998 publication date are anticipated.

FY 1997/98 Sources of New Funds (Actual)



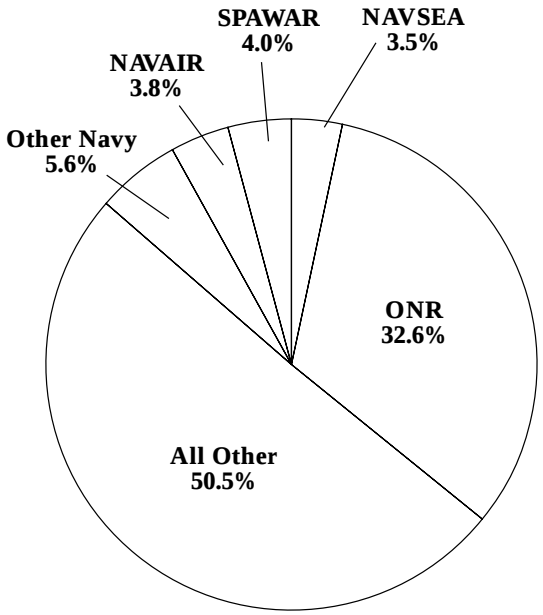
FY 1997 FY 1998

Source of Funds (%)

FY 1997	Reimbursable	$M Direct Cite	Total
Office of Naval Research (ONR)	225.5	57.1	282.6
Naval Sea Systems Command (NAVSEA)	21.2	13.2	34.4
Space and Naval Warfare Systems Command (SPAWAR)	21.3	12.0	33.3
Naval Air Systems Command (NAVAIR)	20.4	10.8	31.2
Other Navy	49.1	23.3	72.4
All Other	228.8	113.3	342.1
Total Funds	566.3	229.7	796.0

FY 1998	Reimbursable	$M Direct Cite	Total
Office of Naval Research (ONR)	209.9	51.6	261.5
Naval Sea Systems Command (NAVSEA)	21.6	13.3	34.9
Space and Naval Warfare Systems Command (SPAWAR)	23.9	11.7	35.6
Naval Air Systems Command (NAVAIR)	19.5	16.8	36.3
Other Navy	48.9	23.3	72.2
All Other	172.7	109.1	281.8
Total Funds	496.5	225.8	722.3

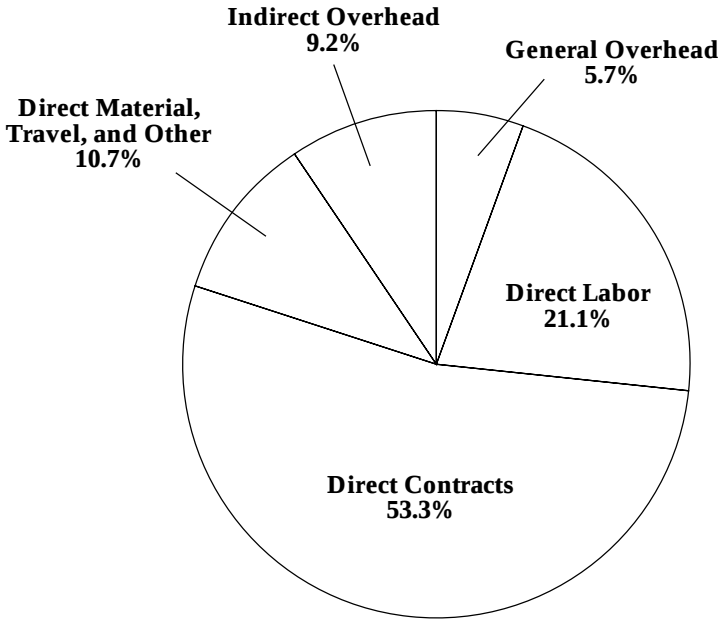
FY 1999 Sources of New Funds (Plan)



Source of Funds (%)

		$M	
FY 1999	**Reimbursable**	**Direct Cite**	**Total**
Office of Naval Research (ONR)	222.0	28.4	250.4
Naval Sea Systems Command (NAVSEA)	16.4	10.1	26.5
Space and Naval Warfare Systems Command (SPAWAR)	21.9	8.9	30.8
Naval Air Systems Command (NAVAIR)	19.2	10.1	29.3
Other Navy	29.9	12.9	42.8
All Other	208.5	179.6	388.1
Total Funds	517.9	250.0	767.9

FY 1999 Distribution of New Funds (Plan)

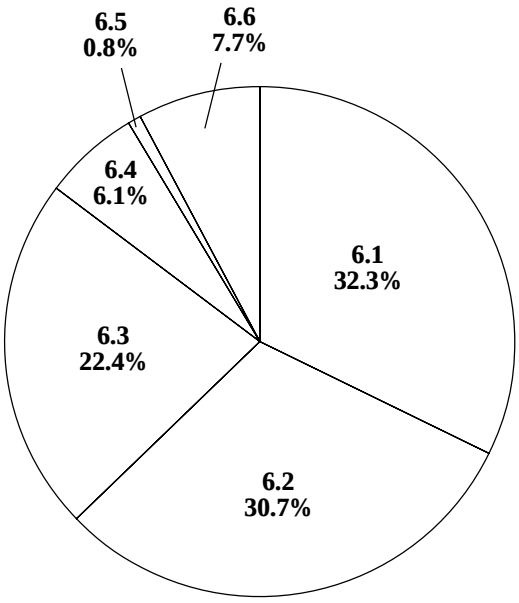


Distribution of Funds (%)

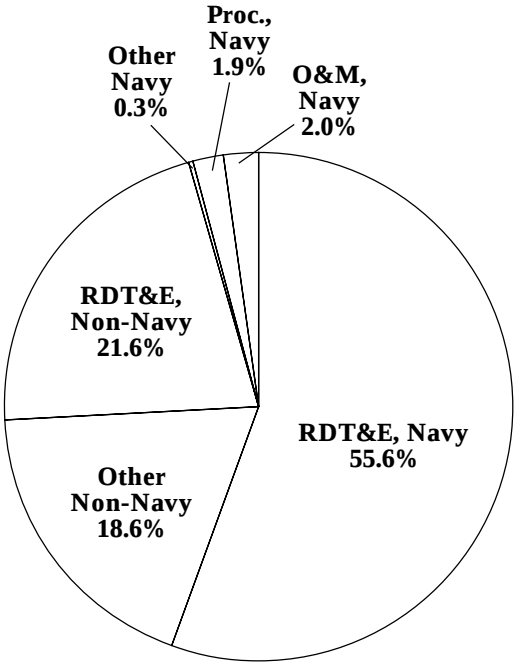
	$M
Direct Labor	162.4
General Overhead	43.5
Indirect Overhead	70.7
Direct Material, Travel, and Other	82.3
Direct Contracts*	409.0
Total Funds	767.9

*Direct contracts include reimbursable and direct citation funding.

FY 1999 Reimbursable New Funds by Category (Plan)



Distribution of RDT&E, Navy (%)
($287.8)



Distribution of Reimbursable (%)
($517.9)

	$M		
Category	Navy	Non-Navy	Total
6.1 Research	93.1	2.9	96.0
6.2 Exploratory Development	88.2	22.8	111.0
6.3 Advanced Development	64.7	73.2	137.9
6.4 Engineering Development	17.5	4.9	22.4
6.5 Management and Support	2.3	1.0	3.3
6.6 Operational Systems Development	22.0	7.3	29.3
Subtotal RDT&E	287.8	112.1	399.9
Operation and Maintenance	10.5	4.2	14.7
Procurement	9.8	12.1	21.9
Other	1.3	80.1	81.4
Total Reimbursable Funds	309.4	208.5	517.9

Personnel Information*

Civilian

Full-Time, Permanent (FTP)		
Graded	2617	
Ungraded	127	
Total	2744	
Temporary, Part-Time, Intermittent (TPTI)		
TPTI	308	
Total Civilian	3052	
Graded FTP Breakdown		
Scientists, Engineers, and SES		1576
Administrative—Professional		62
Administrative—Management		334
Technicians		298
Other-Clerical		238
Other-General		109
Total		2617
Civilian Budgeted		
End-Strength	3041	

Military

Officers	46
Enlisted	137
Total Military On-Board	183
Military Allowance	188

On-Board	Total Military	Total Civilian	FTP	TPTI	FTP Ungraded	FTP Graded
3358	183	3052	2744	308	127	2716

Annual Civilian Turnover Rate (%) (permanent employees only)

	1994	1995	1996	1997	1998
Research divisions	9.4	9.8	7.3	8.7	9.1
Nonresearch areas	9.1	9.2	9.8	8.6	12.3
Entire Laboratory	9.3	9.6	7.9	8.7	9.8

Highest Academic Degrees Held by Permanent Employees

Bachelors	589
Masters	401
Doctorates	839

*Military numbers are current as of January 1999; figures include all NRL sites.
Numbers are current as of March 1999; figures include all NRL sites.
Civilian Budgeted End-Strength number is for FY 1999.

Professional Development

Professional Development

NRL has established programs for the professional and personal development of its employees so they may better serve the needs of the Navy. These programs develop and retain talented people and keep them abreast of advanced technology and management skills. Graduate assistantships, fellowships, sabbatical study programs, cooperative education programs, individual college courses, and short courses for personal improvement contribute to professional development.

Programs also exist for non-NRL employees. These programs enhance research efforts by providing means for non-NRL professionals to work at the Laboratory, thereby improving the interchange of ideas, meeting critical short-term technical requirements, and providing sources for new scientists and engineers. The programs include two-year graduate fellowships, faculty and professional interchanges, undergraduate work, and introducing gifted and talented high school students to the world of technology.

Programs for NRL Employees

During 1998, under the auspices of the Employee Development Branch, NRL employees participated in about 4,000 individual training events. Many of these were presented in-house courses on diverse technical subjects, computer software, management techniques, and enhancement of such personal skills as efficient use of time, project management, memory improvement, and interpersonal communications.

One common study procedure is for employees to work full time at the Laboratory while taking job-related scientific courses at universities and schools in the Washington area. The training ranges from a single course to full graduate-level programs. Tuition for training is paid by NRL. The formal programs offered by NRL are described below.

Graduate Programs

• The **Advanced Graduate Research Program** (formerly the Sabbatical Study Program, which began in 1964) enables selected professional employees to devote full time to research or pursue work in their own or a related field for one year at an institution or research facility of their choice without the loss of regular salary, leave, or fringe benefits. NRL pays all educational costs, travel, and moving expenses for the employee and dependents. Criteria for eligibility include professional stature consistent with the applicant's opportunities and experience, a satisfactory program of study, and acceptance by the facility selected by the applicant. The program is open to paraprofessional (and above) employees who have completed six years of Federal service, four years of which are required at NRL.

• The **Edison Memorial Graduate Training Program** enables employees to pursue advanced studies in their fields at local universities. Participants in this program work 24 hours each workweek and pursue their studies during the other 16 hours. The criteria for eligibility include a minimum of one year of service at NRL, a bachelor's or master's degree in an appropriate field, and professional standing in keeping with the candidate's opportunities and experience.

• To be eligible for the **Select Graduate Training Program**, employees must have a college degree in an appropriate field and must have demonstrated ability and aptitude for advanced training. Students accepted in this program devote a full academic year to graduate study. While attending school, they receive one half of their salary; and NRL pays for tuition, books, and laboratory expenses.

• The **Naval Postgraduate School** (NPS), located in Monterey, California, provides graduate programs to enhance the technical preparation of Naval officers and civilian employees who serve the Navy in the fields of science, engineering, operations analysis, and management. It awards a master of arts degree in national security affairs and a master of science degree in many technical disciplines.

NRL employees desiring to pursue graduate studies at NPS may apply for a maximum of six quarters away from NRL, with thesis work accomplished at NRL. Specific programs are described in the NPS catalog. Participants will continue to receive full pay and benefits during the period of study.

• Research conducted at NRL may be used as thesis material for an advanced degree.

This original research is supervised by a qualified employee of NRL who is approved by the graduate school. The candidate should have completed the required course work and should have satisfied the language, residence, and other requirements of the graduate school from which the degree is sought. NRL provides space, research facilities, and supervision but leaves decisions on academic policy to the cooperating schools.

Professional Development

NRL has programs, professional society chapters, and informal clubs that enhance the professional growth of employees. Some of these are listed below.

• The **Congressional Fellowship Program**, sponsored by the American Political Science Association, provides an opportunity for some of the most promising young, technically oriented Federal executives to participate in a variety of assignments designed to develop their knowledge and understanding of Congressional operations. These Fellows share activities with other members of the Congressional Fellowship Program who come mainly from journalism, law, and college teaching.

• The **LEGIS Fellows Program** provides assignments for personnel whose current or prospective positions may require working knowledge of the operations of the Congress. The Fellows receive instruction and hands-on experience in a Congressional office through training/developmental activities such as seminars, intensive briefings, and assignments on the staff of a member, committee, or support agency of the Congress in Washington, DC.

• The **Counseling Referral Service** (C/RS) helps employees to achieve optimal job performance through counseling and resolution of problems such as family, stress and anxiety, behavioral, emotional, and alcohol- or drug- related problems that may adversely impact job performance.

C/RS provides confidential assessments and short-term counseling, as well as training workshops and referrals to additional resources in the community. (Contact Dr. Ralph Surette at (202) 767-6857.)

• The **NRL WISE Network**, a merger of the NRL Women's S&T Network and the NRL WISE Chapter, is open to all professional women in science and engineering. The goal of this organization is to provide an environment for personal and professional growth. The organization sponsors projects that will lead to such an environment such as the NRL Mentor Program. In addition, informal monthly luncheon meetings and seminars are held. Distinguished female scientists and engineers are invited to discuss with the group their professional experience.

Members of the **NRL WISE Network** meet at noon the first Friday of each month at the science lounge in building 222. These brown bag luncheon meetings are open to all NRL female scientists and engineers, including contractors and postdoctoral associates. If you would like to be on the electronic mailing list, please send your e-mail address to Women@ccf.nrl.navy.mil in order to be notified with events and issues of interest. (For further information, contact the secretary of the **NRL WISE Network**, Dr. Elizabeth A. Dobisz at (202) 767-5159).

• **Sigma Xi**, the Scientific Research Society, encourages and acknowledges original investigation in scientific research. As an honor society for research scientists, individuals who have demonstrated the ability to perform original research are elected to membership in local chapters. The NRL-Edison Chapter, comprised of several hundred members, recognizes leadership research at NRL by presenting awards annually in pure and applied science to outstanding NRL staff members. The NRL-Edison Chapter also sponsors lectures at NRL on a wide range of scientific topics for the entire NRL community. These lectures are delivered by scientists from all over the nation and the world. The highlight of the Sigma Xi lecture series is the Edison Memorial Lecture, traditionally featuring a Nobel laureate. (Contact Dr. David van Keuren at (202) 767-4263.)

• The **NRL Mentor Program** was established to provide an innovative approach to professional and career training and an environment for personal and professional growth. It is open to all NRL employees in all job series and at all sites. Mentorees are matched with successful, experienced colleagues with more technical and/or managerial experience, who can provide them with the knowledge and skills needed to maximize their contribution to the success of their immediate organization, to NRL, to the Navy, and to their chosen career fields. The ultimate goal of the program is to increase job productivity, creativity, and satisfaction through better communication, understanding, and training. NRL Instruction 12400.1 established the NRL

Mentor Program, and it provides the policy and procedures for the program. (Contact Elaine Butler at (202) 767-6736.)

• The Charlotte Moore-Sitterly Chapter of **Federally Employed Women, Inc.** (FEW) was chartered at NRL in 1993. FEW is an international organization of federally employed women and men whose purpose is to eliminate sex discrimination and sexual harassment and enhance career opportunities for women in government. FEW works closely with other Federal agencies and organizations, including the Office of Personnel Management, Equal Employment Opportunity Commission, and Federal Women's Program subcommittees. (Contact Dr. Virginia Degiorgi at (202) 767-9027.)

• Employees interested in developing effective self-expression, listening, thinking, and leadership potential are invited to join either of two NRL chapters of **Toastmasters International**, the Thomas Edison Club or the Forum Club. Members of these clubs, who possess diverse career backgrounds and talents, learn to communicate not by rules but by practice in an atmosphere of understanding and helpful fellowship. NRL's Commanding Officer and the Director of Research endorse Toastmasters. (Thomas Edison Club: contact Jim Waldenfels at (202) 767-3003 or at his e-mail address, waldenfels@contracts.nrl.navy.mil; Forum Club: contact Mike Fromm at (202) 404-1389 or at his e-mail address, fromm@poama.nrl.navy.mil.

Continuing Education

NRL employees take government sponsored college courses (undergraduate and graduate) in order to improve their skills and keep abreast of current developments in their fields.

• The Human Resources Office (HRO) at NRL offers to all employees **short courses** in certain program areas that are not available at local schools; Laboratory employees may attend these courses at nongovernment facilities as well. Interagency courses in management, personnel, finance, supervisory development, clerical skills, and other areas are also available.

Other Programs

• The **Brookings Institution** offers a variety of seminars and conferences devoted to research, education, and publication on important issues of domestic and foreign policy.

• OPM's **Management Development Center** offers one- and two-week courses in intensive policy and management training for government managers and executives.

• The **Excellence in Government Fellows Program** is an extensive, year-long leadership development opportunity to build the capacity of mid-level federal managers to lead organizations and produce results. As part of their fellowship year, participants develop strategies for meeting the complex challenges facing their organizations.

Technology Transfer

• The **Office of Research and Technology Applications Program (ORTA)** ensures the full use of the results of the Nation's federal investment in research and development by transferring federally owned or originated technology to state and local governments and the private sector. (Contact Dr. Catherine Cotell, Code 1004 at (202) 404-8411.)

Technology Base

• The **Scientist-to-Sea Program** (STSP) provides increased opportunities for Navy R&D laboratory/center personnel to go to sea for several days to gain first-hand insight into operational factors affecting system design, performance, and operations on a variety of ships.

For further information on the Technology Base Programs, contact Dr. Stephen Sacks, Code 5006, (202) 767-3666.

Equal Employment Opportunity (EEO) Programs

Equal employment opportunity is a fundamental NRL policy for all persons, regardless of race, color, sex, religion, national origin, age, or physical/mental handicap. The EEO office's major functions include affirmative action in employment, discrimination complaint process, EEO training, advice and guidance to management on EEO policy, and the following special emphasis programs:

• The **Federal Women's Program** (FWP) supports and enhances employment and advancement opportunities for women and addresses issues that affect women in the workplace.

• The **Hispanic Employment Program** (HEP) focuses on working with supervisors, managers, and subcommittees to recruit and place qualified Hispanics. The program is involved with Hispanic community organizations and local schools and provides activities specifically designed to offer information on employment and advanced education opportunities to Hispanics.

• The **African-American Employment Program** (AAEP) concentrates on recruiting, developing, and advancing African-American employees throughout NRL. It also encourages employees to achieve their maximum potential. The AAEP sponsors awareness programs with distinguished persons as guest lecturers.

• The **Individuals with Disabilities Program** (IWD) assists management to improve employment and advancement opportunities for qualified disabled employees. It also advises on accommodations necessary for disabled persons. The IWD recruits disabled students from colleges and universities for summer, co-op, and permanent positions in engineering and science.

• The **Asian-American/Pacific Islander Program** (API) identifies areas of concern regarding the recruitment, selection, advancement, retention, and utilization of API employees throughout NRL. The program interacts with API professional/community organizations to address employment concerns.

• The **Federal Employment Opportunity Recruitment Program** (FEORP) is designed to establish, maintain, and update targeted recruitment programs to reduce the conspicuous absence or manifest imbalance categories of NRL employment through innovative internal and external recruitment. In addition, it fosters relationships with minority and women's institutions and organizations.

Special programs are held during the year to promote an awareness of the contributions and capabilities of women and minorities. (Contact the EEO office at (202) 767-2486 for all EEO programs.)

Other Activities

• The **Community Outreach Program** traditionally has used its extensive resources to foster programs that provide benefits to students and other community citizens. Volunteer employees assist with and judge science fairs, give lectures, tutor, mentor, coach, and serve as classroom resource teachers. The program also sponsors African-American History Month art and essay contests for local schools, student tours of NRL, a student Toastmasters Youth Leadership Program, an annual holiday party for neighborhood children, a surplus computer transfer program, and an annual book drive to support school libraries. Through this program NRL has active partnerships with four District of Columbia, three Aberdeen, Maryland, and three Calvert County, Maryland, public schools. (Contact the Public Affairs Office at (202) 767-2541.)

• Other programs that enhance the development of NRL employees include four computer user groups (**IBM PC**, **Mac**, **NeXT**, and **Sun**) and the **Amateur Radio Club**. The **Recreation Club** accommodates the varied interests of NRL's employees with its numerous facilities, such as a refurbished 25-yard, 6-lane indoor swimming pool; basketball and volleyball courts; a weight room and exercise area; table tennis; meeting room; softball and basketball leagues; hot tubs; saunas; classes in five different types of martial arts; aerobics exercise; swimming, water aerobics, and water walking. The **Showboaters**, a nonprofit drama group that presents live theater for the enjoyment of NRL and the community, performs two major productions each year in addition to occasional performances at Laboratory functions and benefits for local charities. Though based at NRL, membership in Showboaters is not limited to NRL employees.

Programs for Non-NRL Employees

Several programs have been established for non-NRL employees. These programs encourage and support the participation of visiting scientists and engineers in research of interest to the Laboratory. Some of the programs may serve as stepping-stones to federal careers in science and technology. Their objective is to enhance the quality of the Laboratory's research activities through working associations and interchanges with highly capable scientists and engineers and to provide opportunities for outside scientists and engineers to work in the Navy laboratory environment. Along with enhancing the Laboratory's research, these programs acquaint participants with Navy capabilities and concerns.

Recent Ph.D., Faculty Member, and College Graduate Programs

• The **National Research Council (NRC)/ NRL Cooperative Research Associateship Program** selects associates who conduct research at NRL in their chosen fields in collaboration with NRL scientists and engineers. The tenure period is two years.

• The **American Society for Engineering Education (ASEE) Postdoctoral Fellowship Program** aims to increase the involvement of highly trained scientists and engineers in disciplines necessary to meet the evolving needs of naval technology. Appointments are for one year (renewable for a second and sometimes a third year). These competitive appointments are made by ASEE.

• The **Consortium for Oceanographic Research and Education (CORE) Postdoctoral Fellowship Program.** Administered in much the same way as the other two, this program selects associates to conduct research in ocean and atmospheric sciences only. The aim is to recruit more scientists and engineers in these specialized areas.

• The American Society for Engineering Education also administers the **Navy/ASEE Summer Faculty Research Program** for university faculty members to work for ten weeks with professional peers in participating Navy laboratories on research of mutual interest.

• The **NRL/United States Naval Academy (USNA) Cooperative Program for Scientific Interchange** allows faculty members of the U.S. Naval Academy to participate in NRL research. This collaboration benefits the Academy by providing the opportunity for USNA faculty members to work on research of a more practical or applied nature. In turn, NRL's research program is strengthened by the available scientific and engineering expertise of the USNA faculty.

• The **National Defense Science and Engineering Graduate Fellowship Program** helps U.S. citizens obtain advanced training in disciplines of science and engineering critical to the U.S. Navy. The three-year program awards fellowships to recent outstanding graduates to support their study and research leading to doctoral degrees in specified disciplines such as electrical engineering, computer sciences, material sciences, applied physics, and ocean engineering. Award recipients are encouraged to continue their study and research in a Navy laboratory during the summer.

For further information about these six programs, please contact Mrs. Lesley Renfro at (202) 404-7450.

• The **Professional Development Program for Ensigns** assigns newly commissioned Ensigns who are awaiting future training to NRL, working in areas of their own choosing commensurate with their academic qualifications. These young officers provide a fruitful summer of research assistance, while gaining valuable experience in the Navy's R&D program.

For more information, contact the Military Administrative Office, LT Paul Simmons at (202) 767-7511.

Professional Appointments

• **Faculty Member Appointments** use the special skills and abilities of faculty members for short periods to fill positions of a scientific, engineering, professional, or analytical nature.

• **Consultants and experts** are employed because they are outstanding in their fields of specialization, or because they possess ability of a rare nature and could not normally be employed as regular civil servants.

• **Intergovernmental Personnel Act Appointments** temporarily assign personnel from the state or local government or educational institution to the federal government (or vice versa) to improve public services rendered by all levels of government.

High School/Undergraduate/Graduate College Student Programs

The student programs are tailored to the undergraduate and graduate students to provide employment opportunities and work experience in naval research. These programs are designed to attract applicants for student and full professional employment in fields such as engineering, physics, mathematics, and computer science. The student employment programs are designed to help students and the educational institutions gain a better understanding of NRL's research, its challenges, and its opportunities. The employment programs for college students include the following:

• The **Student Career Experience Program** (formerly known as Cooperative Education Program) employs students in study-related occupations. The program is conducted in accordance with a planned schedule and a working agreement between NRL, the educational institution, and the student. Primary focus is on students pursuing bachelor degrees in engineering, computer science, or the physical sciences.

• The **Student Temporary Employment Program (STEP)** enables students to earn a salary while continuing their studies and offers them valuable work experience.

• The **Student Employment Program** employs students for the summer in paraprofessional and technician positions in engineering, physical sciences, computer sciences, and mathematics.

• The **Student Volunteer Program** helps students gain valuable experience by allowing them to voluntarily perform educationally related work at NRL.

For additional information on these undergraduate and graduate student programs, contact (202) 767-8313.

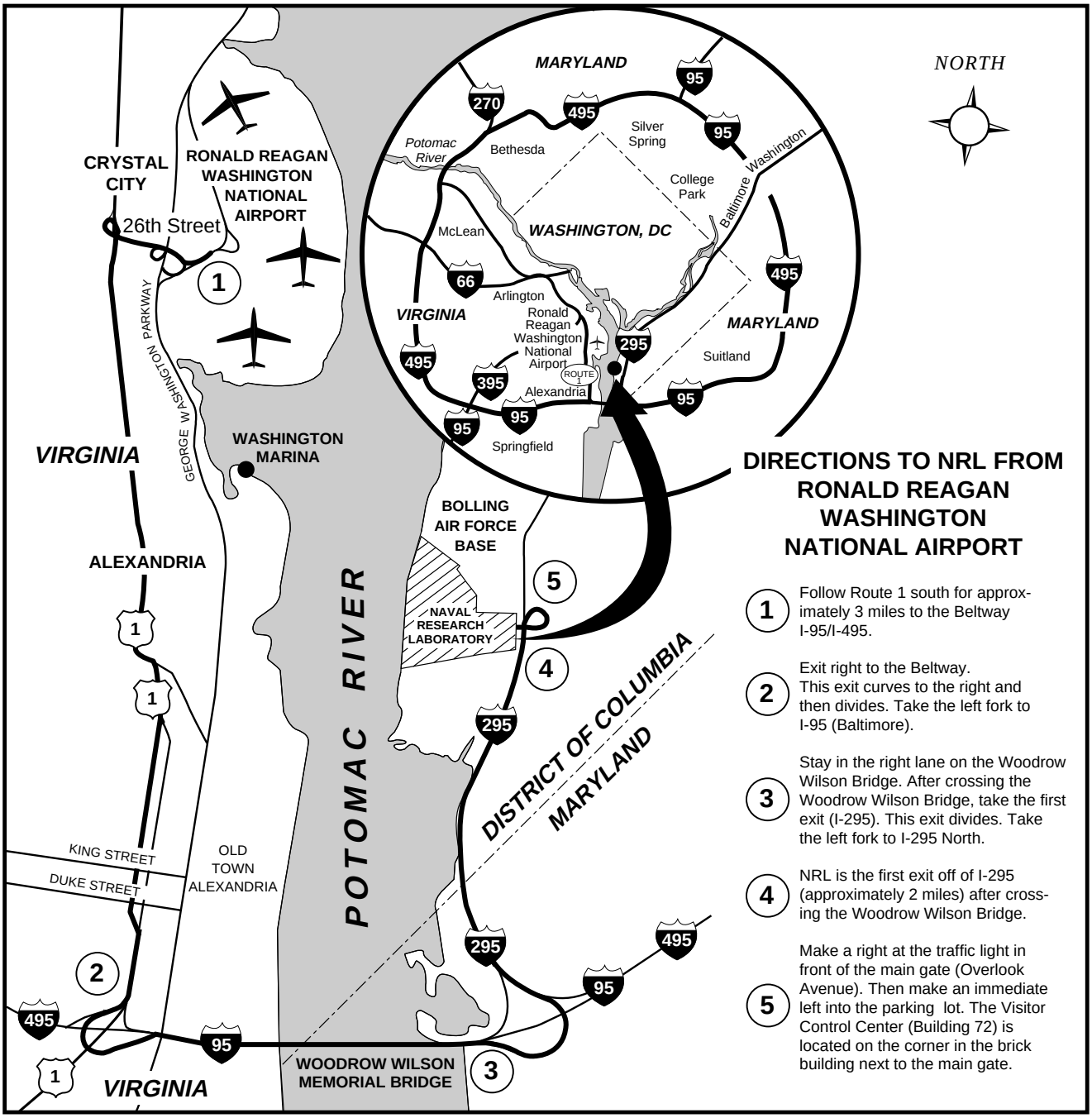
High School Programs

• The **DoD Science & Engineering Apprentice Program** (SEAP) employs high school juniors and seniors to serve for eight weeks as junior research associates. Under the direction of a mentor, students gain a better understanding of research, its challenges, and its opportunities through participation in scientific programs. Criteria for eligibility are based on science and mathematics courses completed and grades achieved; scientific motivation, curiosity, and capacity for sustained hard work; a desire for a technical career; teacher recommendations; and achievement test scores. The NRL program is the lead program and the largest in DoD.

For additional information on these programs, please contact the Employee Development Branch (Code 1840) at (202) 767-2956.

General Information

Naval Research Laboratory
(Washington, DC)

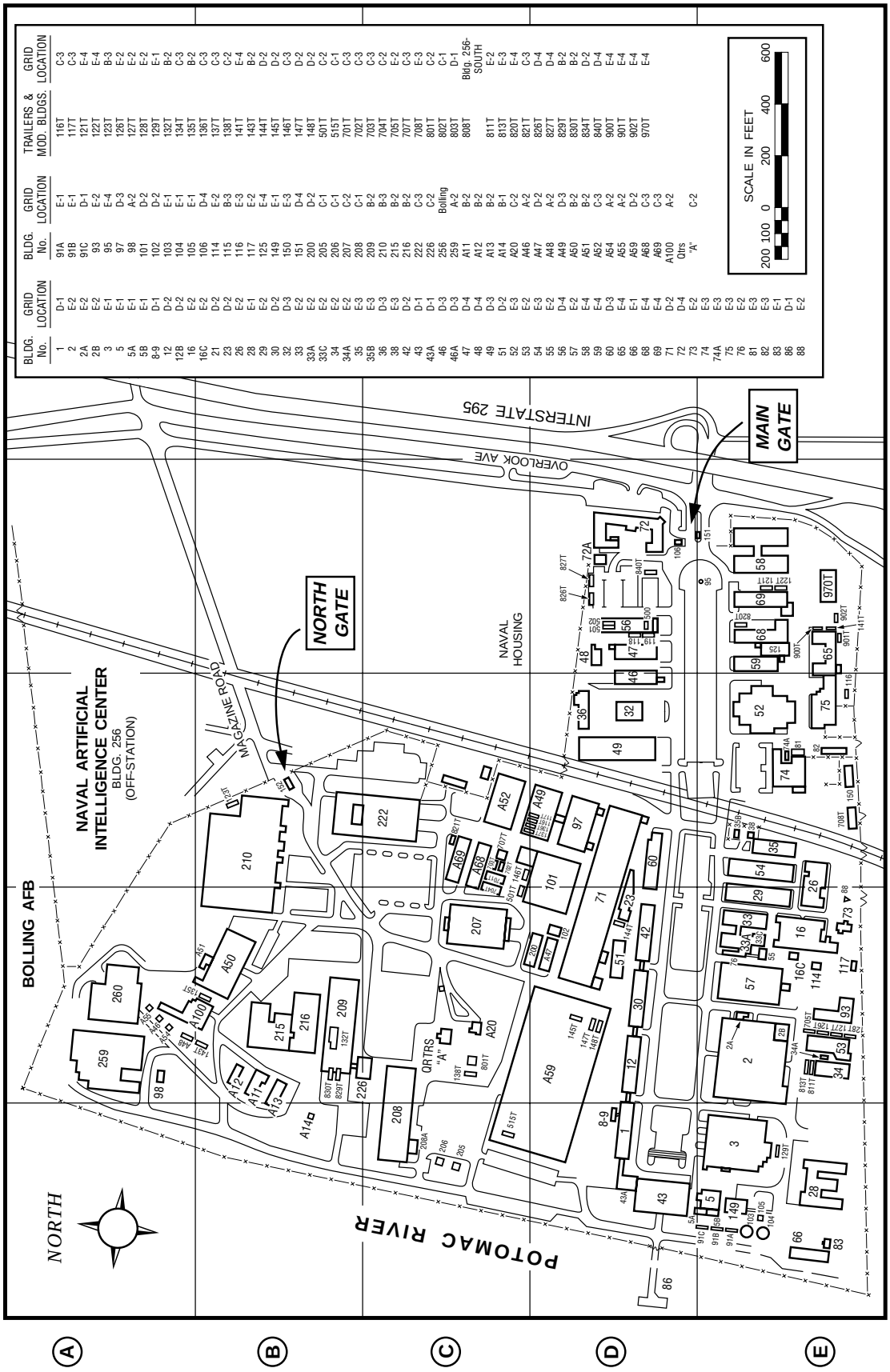


DIRECTIONS TO NRL FROM RONALD REAGAN WASHINGTON NATIONAL AIRPORT

1. Follow Route 1 south for approximately 3 miles to the Beltway I-95/I-495.
2. Exit right to the Beltway. This exit curves to the right and then divides. Take the left fork to I-95 (Baltimore).
3. Stay in the right lane on the Woodrow Wilson Bridge. After crossing the Woodrow Wilson Bridge, take the first exit (I-295). This exit divides. Take the left fork to I-295 North.
4. NRL is the first exit off of I-295 (approximately 2 miles) after crossing the Woodrow Wilson Bridge.
5. Make a right at the traffic light in front of the main gate (Overlook Avenue). Then make an immediate left into the parking lot. The Visitor Control Center (Building 72) is located on the corner in the brick building next to the main gate.

Naval Research Laboratory
4555 Overlook Avenue, SW
Washington, DC 20375-5320
(202) 767-3200

Location of Buildings at NRL Washington



BLDG. No.	GRID LOCATION
1	D-1
2	E-2
2A	E-2
2B	E-2
3	E-1
5	E-1
5A	E-1
5B	E-1
8-9	D-1
12	D-2
12B	D-2
16	E-2
16C	E-2
21	D-2
23	D-2
26	E-2
28	E-1
29	E-2
30	D-2
32	D-3
33	E-2
33A	E-2
33C	E-2
34	E-2
34A	E-3
35	E-3
35B	E-3
36	D-3
38	E-3
42	D-2
43	D-1
43A	D-1
46	D-3
46A	D-3
47	D-4
48	D-4
49	D-3
51	D-2
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53	E-2
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56	D-4
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58	E-4
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66	E-1
68	E-4
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71	D-2
72	D-4
73	E-2
74	E-3
74A	E-3
75	E-3
76	E-2
81	E-3
82	E-3
83	E-1
86	E-1
88	E-2

BLDG. No.	GRID LOCATION
91A	E-1
91B	E-1
91C	D-1
93	E-2
95	E-4
97	D-3
98	A-2
101	E-1
102	D-2
103	E-1
104	E-1
105	E-1
106	D-4
114	E-2
115	E-3
116	E-3
117	E-2
125	E-4
149	E-3
150	D-4
151	D-2
200	D-2
205	C-1
206	C-1
207	C-2
208	C-1
209	B-3
210	B-2
215	B-2
216	C-3
222	C-3
226	C-2
256	Bolling
259	A-2
A11	B-2
A12	B-2
A13	B-2
A14	C-2
A20	C-2
A46	A-2
A47	D-2
A48	A-2
A49	D-3
A50	B-2
A51	C-3
A52	A-2
A59	A-2
A68	D-2
A69	C-3
A100	A-2
Qtrs "A"	C-2

TRAILERS & MOD. BLDGS.	GRID LOCATION
116T	C-3
117T	C-3
121T	E-4
122T	E-4
123T	B-3
126T	E-2
127T	E-2
128T	E-2
129T	E-1
132T	B-2
134T	C-3
135T	B-2
136T	C-3
137T	C-3
138T	C-2
141T	E-4
143T	B-2
144T	D-2
145T	D-2
146T	C-3
147T	D-2
148T	D-2
501T	C-2
515T	C-1
701T	C-3
702T	C-3
703T	C-3
704T	C-2
705T	E-2
707T	C-3
708T	E-3
801T	C-2
802T	C-1
803T	D-1
808T	Bldg. 256-SOUTH
811T	E-2
813T	E-3
820T	E-4
821T	C-3
826T	D-4
827T	D-4
829T	B-2
830T	B-2
834T	D-2
840T	D-4
900T	A-2
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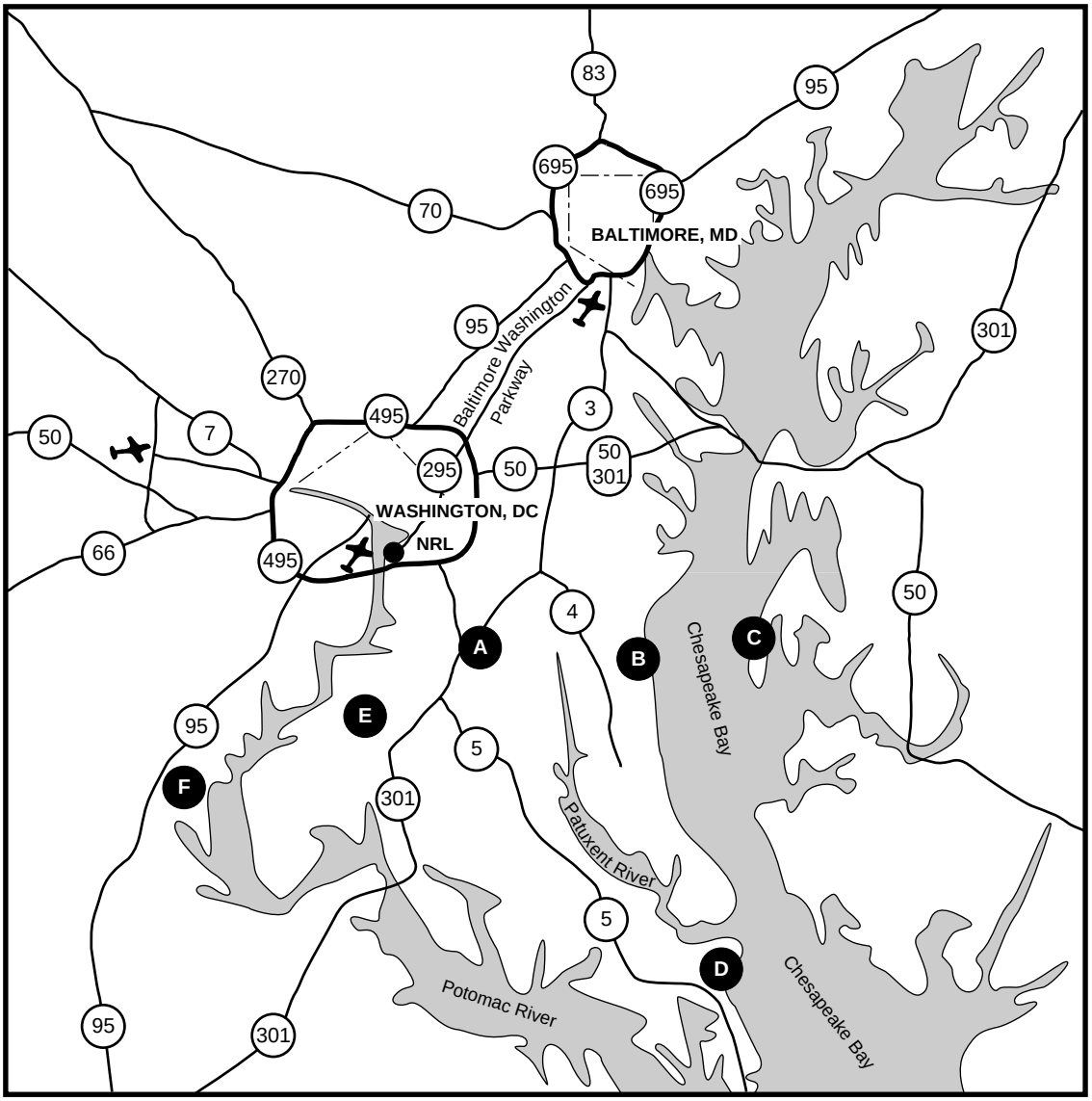
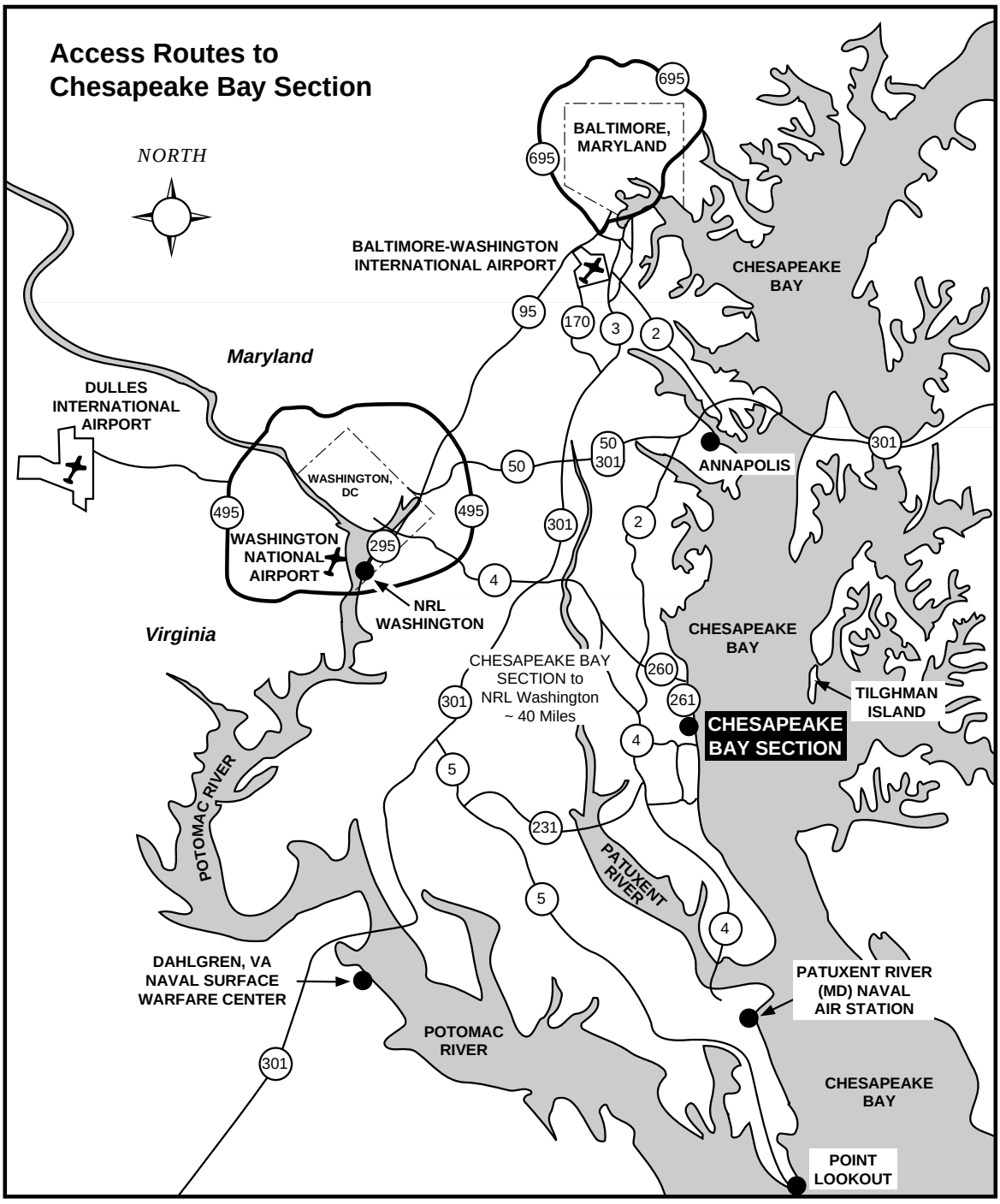
902T	E-4
970T	E-4

Location of Field Sites in the NRL Washington Area



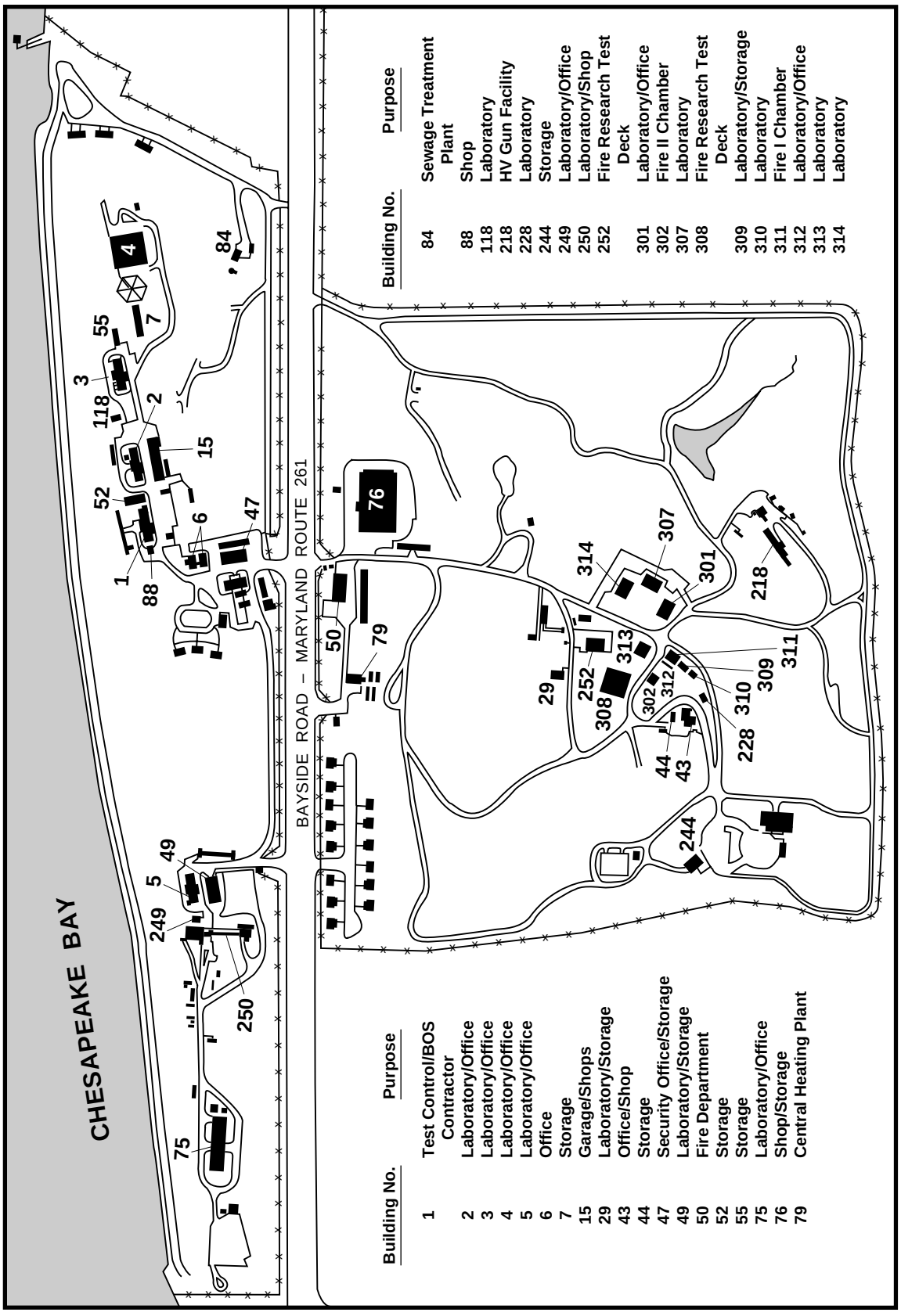
		Location	Approximate Mileage from NRL Washington	Cognizant Code
A	–	Brandywine, MD	28	5500
B	–	Chesapeake Bay Section, Chesapeake Beach, MD	40	3522
C	–	Tilghman Island, MD	110	3522
D	–	Patuxent River (MD) Naval Air Station	64	1600
E	–	Pomonkey, MD	20	8106
F	–	Midway Research Center, Quantico, VA	38	8140

Chesapeake Bay Section
(Chesapeake Beach, Maryland)

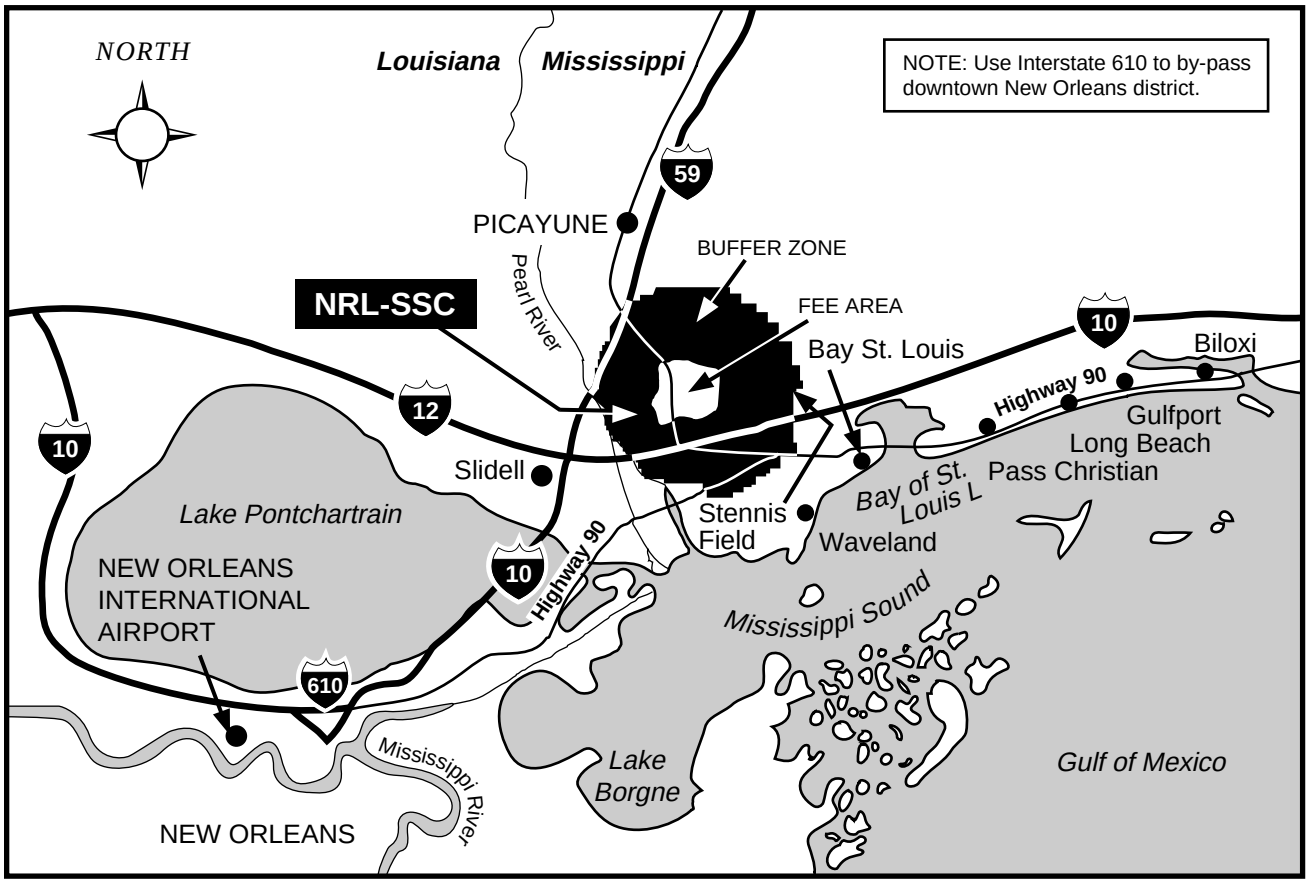


Naval Research Laboratory
Chesapeake Bay Section
5813 Bayside Road
Chesapeake Beach, MD 20732
(301) 257-4002

Location of Buildings
at the Chesapeake Bay Section

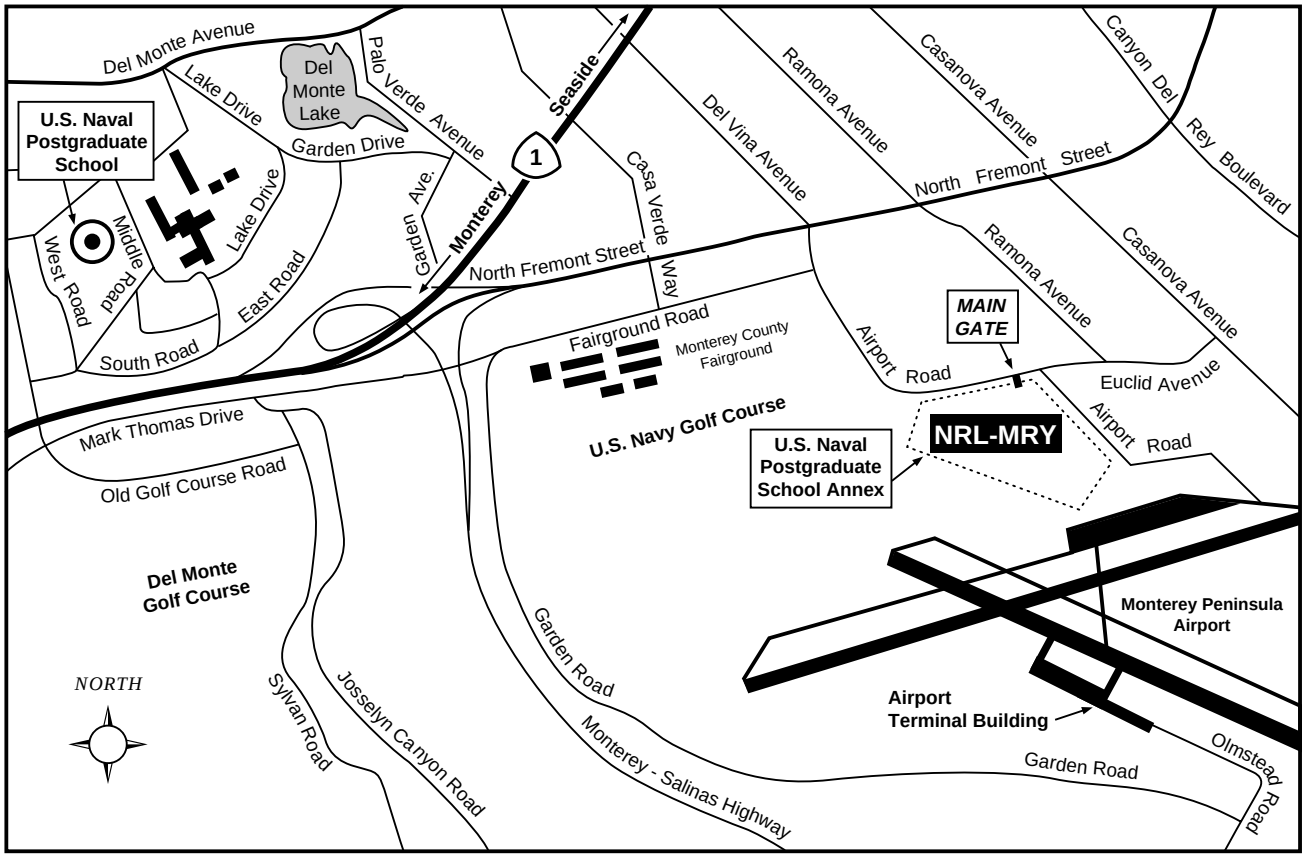


John C. Stennis Space Center
(Stennis Space Center, Mississippi)



Naval Research Laboratory
John C. Stennis Space Center
Stennis Space Center, MS 39529-5004
(228) 688-3390

Naval Research Laboratory Monterey
(Monterey, California)



Naval Research Laboratory
Marine Meterology Division
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(408) 656-4721

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REVIEWED AND APPROVED

CAPT B.W. Buckley, USN
Commanding Officer

June 1999